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Note.—Initialed reviews are written by the following:

Mr F. J. Anscombe	F. J. A.
Mr N. T. J. Bailey	N. T. J. B.
Mr G. E. Dixon	G. E. D.
Mr A. S. C. Ehrenberg	A. S. C. E.
Dr M. A. Keay	M. A. K.
Dr J. Wishart	J. W.

* General studies, see also individual crops.

Plant Breeding Abstracts

Vol. XXI, No. 2

*STATISTICS

FISHER, R. A.

The significance of deviations from expectation in a Poisson Series.

Biometrics 1950 : 6 : 17-24.

A method is given for testing the hypothesis that a sample can reasonably have come from a Poisson population. The method is of particular value when nearly all the observations are very small, say, zeros, ones and twos, when the usual χ^2 criterion is unsatisfactory.

766. BROSS, I.

Fiducial intervals for variance components.

Biometrics 1950 : 6 : 136-44.

In many analyses of variance problems, especially in genetics and sample surveys, the component mean squares can be regarded as estimates of linear functions of certain "variance components." A method, based on R. A. Fisher's ideas, is given in this paper for ascribing fiducial intervals to these variance components. The method applies when the estimate is the difference of two mean squares.

767. QUENOUILLE, M. H.

Proceedings of the Second International Biometric Conference. Experimental Designs. Multivariate experimentation.

Biometrics 1950 : 6 : 303-19.

A review and extension are given of the existing approaches to, and methods of, experimentation when several concomitant variables are measured and used.

768. NANDA, D. N.

Efficiency of the application of discriminant functions in plant selection.

J. Indian Soc. Agric. Statist. 1949 : 2 : 8-19.

The paper discusses two methods of selecting material for genetic improvement, viz. discriminant functions involving yield components only and straight selection based on yield. The results obtained show that the discriminant function model is advantageous over straight selection only if such characters are included in the discriminatory analysis as are not of much value on their own account. Most of the paper consists of a fully worked example from plant breeding.

769.

Proceedings of the Second International Biometric Conference. Recent applications of biometrical methods in genetics.

Biometrics 1950 : 6 : 200-27.

Yates, F.

Experimental techniques in plant improvement.
(pp. 200-07).

A discussion is presented of the problems arising when planning a testing scheme which will be effective in testing the large number of new lines and variates produced in the course of any programme of plant improvement.

* General studies, see also individual crops.

Cavalli, L. L.

The analysis of selection curves. (pp. 208-20).

A method is given for the analysis of selection curves arising when two alleles in competition come to an equilibrium state after a sufficient number of generations, the frequency of each allele at equilibrium being independent of the initial frequencies. The method consists in replacing the difference equation between the frequencies of genotypes in successive generations by a differential equation. The solution of this equation gives a function of the gene frequency which is linear with time. This relationship is then estimated by the method of maximum likelihood.

Finney, D. J.

Scores for the estimation of parameters. (pp. 221-25).

The author's extension to the estimation of genetical parameters of R. A. Fisher's method of scores is briefly surveyed.

770.

SMITH, H. F.

Error variance of treatment contrasts in an experiment with missing observations (with special reference to incomplete Latin squares).

J. Indian Soc. Agric. Statist. 1950 : 2 : 111-24.

The author remarks that the analysis of covariance on dummy variates can be used in conjunction with the method of evaluating standard errors of treatment contrasts after adjustment by regression, to evaluate the error variances of contrasts involving estimates of missing observations. The procedure is illustrated for incomplete Latin squares where a few plots have been affected by abnormal soil conditions. The exact formulae are derived for standard errors of treatment means and simple contrasts in an incomplete Latin square with one missing plot. The derivation for more complex contrasts is illustrated.

771.

GRUNDY, P. M.

The estimation of error in rectangular lattices.

Biometrics 1950 : 6 : 25-33.

The designs discussed are those of Harshbarger (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 601) for agricultural variety trials. A simpler method for the estimation of the within and between block variances is given, and shown, in general, to be better than Harshbarger's.

772.

FEDERER, W. T.

The general theory of prime-power lattice designs. V.

Biometrics 1950 : 6 : 34-58.

The analysis for a 6×6 incomplete lattice square is given, together with a fully-worked example from agricultural trials.

773.

YOUNDEN, W. J.

A note on the four by four Latin squares.

Biometrics 1950 : 6 : 289-90.

It is pointed out that the 6 degrees of freedom for error in a 4×4 Latin square may be separated into 6 individual degrees of freedom, each corresponding to the component of error applicable to specific treatment contrasts.

774.

ROBINSON, H. F. and

WATSON, G. S.

An analysis of simple and triple rectangular lattice designs.

Tech. Bull. N.C. Agric. Exp. Sta. 1949 : No. 88 : Pp. 56.

A simplified method is presented of analysing simple and triple rectangular designs. Methods are also included of covariance analysis for rectangular lattice designs and for supplying missing data.

775. WALCZYK, F.
Zur Berechnung kombinierter Mittelwerte. (**On the calculation of combined mean values**).
Z. PflErnähr. Düng. 1950 : 51 : 62-66.

A method is described whereby in determining the combined mean value from the results of a series of parallel observations, e.g. variety trials, the effect of gross errors is minimized. Binomial coefficients are applied to weight the separate results in the series. The calculations shown for a model experiment demonstrate that a more correct value for the combined mean is obtained by the author's method and its use is recommended in cases where observations are affected by conditions, such as differences in soils, which cannot be controlled.

*GENETICS

776. SOMOS, A.
Mit láttunk a Szovjetúnió mezőgazdasági kísérleti telepein? (**What did we see in the agricultural research stations of the Soviet Union?**)
Agrártudomány, Budapest 1949 : 1 : 269-70, 441-43.

Impressions on Soviet agricultural research are given by a Hungarian delegation. Appreciative reference is made to the plant breeding achievements of Mičurin and Lysenko, and to the materialist philosophy guiding them.

777. STEIN, E.
Dem Gedächtnis von Carl Erich Correns nach einem halben Jahrhundert der Vererbungswissenschaft. (**To the memory of Carl Erich Correns after half a century of genetics**).
Naturwissenschaften 1950 : 37 : 457-63.

This paper is a eulogy of the life and work of Correns. His researches, which clarified problems in several fields of genetic investigation, are presented in a historical survey.

778. BRÜCHER, E. H.
Cincuenta años de estudio de la genética. (**Fifty years of genetic study**).
Ciencia e Investigación, B. Aires 1950 : 6 : 469-70.

A brief appreciation is presented of the work of Tschermak-Seysenegg in pure genetics and plant breeding.

779. BUZZATI-TRAVERSO, A.
Genetica e biologia generale. (**Genetics and general biology**).
Scientia Genetica 1950 : 3 : 270-82.

In the author's opinion the vast body of knowledge accumulating in the various branches of biological science requires coordination and interpretation as a whole on the basis of some broad general theory; but the theory must be a real one and not a mere exercise in dialectics with recourse to metaphysics for an explanation of vital phenomena. It is believed that genetic research can make an important contribution towards such a synthesis.

* General studies, see also individual crops.

780. CHEVALIER, A.
 Comparaison entre la génétique néomendélienne, la génétique soviétique ou lyssenkiste et l'oeuvre de N. I. Vavilov. (**Comparison between neo-Mendelian genetics, Soviet or Lysenkoist genetics and the work of N. I. Vavilov**).
 Rev. Bot. Appl. 1950 : 30 : 461-67.

A French translation by J. Castier of Huxley's "Soviet Genetics and World Science," reviewed in *Plant Breeding Abstracts*, Vol. XX, p. 174, has provided the material for this article in defence of Vavilov and the science of genetics.

781. DORST, J. C.
 Aanpassing. (**Adaptation**).
 H. Veenman en Zonen, Wageningen 1950 : Pp. 16.

Adaptation is discussed with reference to the tenets of Darwinism, Mendelian genetics and Lysenkoism. According to the Russian theory adaptation is active whereas Mendelian geneticists consider it to be passive; although the Russian ideas in some respects resemble those of Lamarck the final appeal is always made to Darwin. It is however, emphasized that Lysenko's theories must be approached as objectively as possible.

Interesting examples mentioned were the perfect adaptation of *Lolium remotum* as a weed of flax and the similar case of wild oats and cereals. The adaptability of a land race is due to its being a mixture. Broekema ensured adaptability in Wilhelmina wheat by mixing several pure lines and the author himself would have done likewise with flax only the line C22, afterwards called Concurrent, was too good to adulterate. The suggestion is made that breeders of leguminous plants should also breed *Rhizobium radicicola*.

782. Centro montano di genetica. (**Mountain centre for genetics**).
 Scientia Genetica 1950 : 3 : 289-90.

The Mountain Centre, founded by the Genetics Centre of the National Research Council at the Spallanzani Institute of the University of Pavia, and established at Terminillo, is described. Its work will be concerned with both animals and plants, and adaptation, environment, phenotypic and genetic variation and other relevant fields of research will be among the practical and theoretical problems for investigation.

783. SINGLETON, W. R.
 Some high lights of the first half century of genetics.
 Sci. Mon. N.Y. 1950 : 71 : 401-07.

A sketch is given of some of the more outstanding events in the history of genetics and crop improvement in the USA in the last fifty years.

784. CASTLE, W. E.
 Are mosaic genes semi-allelic?
 Amer. Nat. 1950 : 84 : 497-98.

In a recent article Komai (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 32) defined semi-allelic genes as genes of similar phenotypic effect located in close sequence in the chromosome without any other intercalated gene, crossing over never or very rarely occurring between them; he added that so-called mosaic inheritance is seen, when both genes are dominant. The present author is of the view that with this concept of semiallelic genes the well-known case of mammalian mosaic colour patterns conforms only in part, drawing attention to the suggestion he offered many years ago in explanation of this case, viz. that a permanent union exists between genes normally behaving as alleles which are thus incapable of occupying the same locus. Such union, it is postulated, is so intimate that resolution into its components is impossible; it is however capable of behaving as a simple allele to either of its constituents separately.

785. GLASS, B. and
PLAINE, H. L.
**The immediate dependence of the action of a specific gene in
Drosophila melanogaster upon fertilization.**
Proc. Nat. Acad. Sci. Wash. 1950 : 36 : 627-34.

A particular gene complex composed of a semidominant mutant, erupt (*er*), and a semi-dominant suppressor of erupt (*Su-er*) was previously discovered by the senior author. The erupt phenotype consists of a large eruption of non-faceted material usually through the centre of one or both eyes. X-ray treatment exerts an inactivating effect upon *Su-er*, attributed to a specific blocking of some phase of the action of this suppressor gene. X-irradiation of spermatozoa and oocytes prior to fertilization produced no inhibition of the suppressor effect; in eggs treated 8 ± 8 min. after fertilization the suppressor effect of *Su-er* was inactivated. It therefore appears that fertilization activates the production of the specific substance or morphogenetic system controlled by *Su-er* and that the gene product in question is present in full amount within 8 min. after fertilization.

786. WALLACE, B.
Allelism of second chromosome lethals in *D. melanogaster*.
Proc. Nat. Acad. Sci. Wash. 1950 : 36 : 654-57.

From an analysis of the frequency of allelism of 100 lethals in chromosome II induced in *Drosophila melanogaster* by a continuous dose of γ rays of approximately 5r. per hour it has been estimated that the minimum number of loci capable of mutating to lethality under these conditions is 400.

787. HARTE, C.
Dominanzwechsel bei *Oenothera* als genetisches und entwicklungs-
geschichtliches Problem. (**Change in dominance in *Oenothera* as
a genetic and as an ontogenetic problem**).
Ber. dtsch. bot. Ges. 1949 : 62 : 112-13.

The lecturer described two different types of change in dominance: one due to the genetic constitution, and the other to some unknown physiological causes concerned with gene action. In the latter case enzyme production which may be affected by environmental factors, may be involved. Catcheside's position effect represents a third way in which the action of allelomorphs may be altered, as a result, in this case, of translocation.

788. BAILEY, N. T. J.
The influence of partial manifestation on the detection of linkage.
Heredity 1950 : 4 : 327-36.

Formulae are given for estimating linkage when misclassification of individuals due to imperfect penetrance of the characters concerned is suspected.

789. SAKAI, K.
(A proposed method for analysis of gene linkage).
Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 93-94.

The technique, called the one chromosome method, is as follows. Two varieties are crossed and then back-crossed for a series of generations till lines are recovered differing from the recurrent parent in having a single pair of chromosomes derived from the non-recurrent parent. These plants are then crossed with the recurrent parent and the F_1 plants selfed. Linkage relations may then be inferred from the segregation data provided by the F_2 generation of this cross.

790. BEUTTEL, E.
Bastardierungsversuche in der Gattung *Streptocarpus* Lindl. II. Die Heterosis bei Streptocarpushybriden. (**Hybridization experiments within the genus *Streptocarpus* Lindl. II. Heterosis in *Streptocarpus* hybrids**).
Z. Bot. 1939 : 35 : 49-90.

In experiments comparing interspecific hybrids of *Streptocarpus* and their parents investigations were carried out on: the size and weight of seeds and embryos; cell size; increase in the surface area of the leaf; assimilation; respiration; colouring matter of the leaf; transpiration; osmotic pressure of the cell contents; plant dry weight and ash content; and the rooting capacity and growth measurements of plants regenerated from leaf cuttings. From these data and from the observed effects of grafting and of growth substances on root regeneration, the writer concludes that in *Streptocarpus* heterosis is essentially due to an increased rate of cell division in the F_1 and not to any initial superiority of the hybrid embryos or seeds before germination. The intensified assimilation observed in the hybrids is regarded as a secondary phenomenon.

The regeneration capacity observed in the hybrids is interpreted as evidence of the influence of the cytoplasm as a contributory factor in heterosis.

Throughout the critical discussion the author makes frequent reference to the findings and conclusions drawn by Ashby in his work on maize and the tomato (cf. *Plant Breeding Abstracts*, Vol. VIII, Abst. 682).

791. GOLDSCHMIDT, R. B.
Marginalia to McClintock's work on mutable loci in maize.
Amer. Nat. 1950 : 84 : 437-55.

The essential facts emerging from McClintock's work on mutable loci in maize, phenotypically expressed in mosaicism, are summarized. The data on the different "states" of the *Ac* and *Ds* loci and the relation of both of these to the phenotypic effect (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2294) are compared with the genetic situation underlying intersexuality in the moth *Lymantria dispar*. In maize the mutable locus *Ds* produces a "mutation" consisting of a break at the locus marking off the proximal third of the short arm of chromosome 9. Mutation at *Ds* is controlled by another locus *Ac*, also dominant, which must be present if *Ds* is to mutate. *Ac* has no influence upon the normal *ds* locus. Mutation to a so-called mutable locus is the consequence of an insertion of the material comprising *Ds* at or near the locus which becomes mutable. Such a locus, although called mutable, is not changed at all; the presence of the transposed *Ds* impedes its action so that it behaves as a recessive. Further facts relevant to the comparison with *L. dispar* are as follows: (1) the action of *Ac* shows a dosage effect so that the phenotypic effect of the *Ds* mutation occurs later in development with increasing dosage; (2) *Ac* and *Ds*, though behaving as simple loci in the Mendelian sense, exist in different conditions, termed states, which also control different times of incidence and intensities of the phenotypic effect; and (3) dosage and state effects are to a certain extent interchangeable and collaborating, e.g. high dosage plus low state act more or less in the same fashion as low dosage plus high state; from these facts McClintock has concluded that the states are quantitative features of the locus, viz. different numbers of subunits. The comparison with the observations on intersexuality in *L. dispar* leads to the conclusion that similar states or levels of potency, representing different quantities of genetic material, are also entailed in the inheritance of this phenomenon. The classical concept of the gene is therefore questioned, as in previous publications by the author. The smallest chromosomal sector which behaves as a Mendelizing locus is believed to be subdivided. The phenotypic effect of any mutant in this sector is the same or nearly the same; this also applies to position effects produced by breaks within the sector. If mutants within this sector can be separated by the rare occurrence of crossing over, the phenomenon of erroneously termed "repeats" is obtained. Mutants within a sector are expected to be additive; an entire sector would therefore appear to be composed of subunits controlling an action proportional to these numbers. A block of the polygenes

postulated by Mather, a locus with quantitatively acting subunits as proposed by McClintock, or a "gene" with different potencies would result. Furthermore, possibly the action of the subunits may vary in different substrates so that a differential action of the whole locus appears, as reported by Stadler (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 189) and Lewis (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2286). Reference is made to the results of work on mosaicism in *Capsella Bursa-pastoris* var. *albovariabilis* by Correns (1919) and on leaf laciniation in *Malva parviflora* by Lilienfeld (1929) as conditional support of the view that the classical concept of the gene is untenable.

An enquiry is made into the intersexual mosaicism in moths to discover whether the work on maize genetics can also throw light on the genetic control of this phenomenon. The conclusion is reached that a phenogenetic explanation is more probable than a chromosomal break or transposition inhibiting the action of a locus in the manner of a position effect; phenogenetic processes are however controlled or shifted by modifiers or dosage systems. Finally, the possible nature of the position effect associated with mosaicism in maize and *Drosophila* is briefly discussed.

792. CATCHESIDE, D. G.
Physiological genetics.
 Ann. Rev. Physiol. 1950 : 12 : 47-70.

Literature published during the period 1947-49 which has bearing on the constitution and reproduction of the gene and the nature of genic control of development and differentiation is reviewed under the headings mutagenic agents, production and detection of biochemical mutations, mechanism of gene action and nature of mutation, the gene and biosynthesis, bacteria, viruses, yeast, the killer character in *Paramecium*, antigenic characters in *Paramecium*, and growth and differentiation; the bibliography contains 130 references.

793. SONNEBORN, T. M.
Partner of the genes.
 Sci. Amer. 1950 : 183 : No. 5 : 30-39.

A popular discussion is given of the role of the cytoplasm in inheritance.

794. BATEMAN, A. J.
Is gene dispersion normal?
 Heredity 1950 : 4 : 353-63.

Instances of leptokurtic distribution are reported for the dispersal of flying insects, for air-borne spores and pollen, and for insect-distributed pollen. It is thought that leptokurtosis rather than normal distribution may thus characterize gene dispersal in general. The effects of leptokurtic distribution on the breeding system are briefly considered.

795. CROSBY, J. L.
Population genetics in the genus *Primula*.
 Abstr. Diss. Univ. Camb. 1948-49 (1950) : 9-10.

An analysis of populations of *Primula vulgaris* in which a rare cross over is believed to have given rise to a long self-fertile homostyle form, has led to the conclusion that long homostyles arising in a normal population will increase in frequency unless the homozygote is completely inviable.

Genetical work has supported the supposition of a low homozygote viability, believed to be a pleiotropic effect of the homostyly genes. Sporophytic contraselection is opposed by selection of homostyle pollen in the gametophyte generation, when there is no interspecific competition, and the resulting population demonstrates natural selection of a gene harmful to the species.

796. TIMOFÉEFF-RESSOVSKY, N. W.
Über den Mutations-mechanismus und die Natur der Gene. (On the mechanism of mutation and the nature of genes).
Nova Acta Leopoldina 1940 : 9 : 650-54.

The fundamentals of inheritance as established by research of the last 40 years and the theories concerning the structure of the genotype are summarized.

The main experiments which have been done on the effect of irradiation by different kinds of rays on the percentage of spontaneous mutations are described. The conclusions have led to the theory that a mutation consists in a structural alteration of a combination of atoms, probably in a large molecule, micelle or part of a micelle. The occurrence of reverse mutations supports this theory. It has been proved valid by further work which showed that for the same doses, as measured in r units, irradiation by neutrons produced rather fewer mutations than X-rays. Again, experiments on seeds, pollen and *Drosophila* showed that the proportion of spontaneous mutations is proportional to the time. Furthermore, some especially frequent mutations are only slightly affected by the temperature, so that it is highly probable that spontaneous mutations are monomolecular reactions.

All the experiments described led to the conclusion that gene mutations represent structural alteration of physicochemical units. The author points out that the validity of his conclusion carries the implication that the gene itself, or at least its essential part, must also be a physicochemical unit. The idea that any large complicated molecules, or micelles, of definite structure can build up others, identical and adjacent, and take part in a specific way in the metabolism of the cell is as plausible as that these functions are fulfilled by multimolecular particles of matter. Support for these views on the nature of the gene, or chromosome, has since been found in work on filterable viruses.

797. AUERBACH, C. and
MOSER, H.
Production of mutations by monochloro- 'mustards.'
Nature, Lond. 1950 : 166 : 1019-20.

The capacity of the substances referred to as semi-H ($\text{ClCH}_2\text{CH}_2\text{S.CH}_2\text{CH}_2\text{OH}$) and butyl-H ($\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{S.CH}_2\text{CH}_2\text{Cl}$) to induce sex-linked lethals in *Drosophila melanogaster* was investigated at the Institute of Animal Genetics, Edinburgh University. Evidence was obtained of the mutagenic ability of butyl-H, the course of mutation frequency with time after treatment being the same as that for mustard gas. Treatment with semi-H resulted in induced lethals but the conditions of this experiment are considered as unsatisfactory and new experiments with this substance have therefore been undertaken. From the results with butyl-H it appears that the possession of two biologically active groups and the capacity to form cross linkages between protein chains are not indispensable properties of mutagenic molecules, as suggested by A. Loveless and other investigators. It may be argued that two active groups are required for the production of chromosome breakage as opposed to gene mutation. The authors believe however that the lethals induced by butyl-H are connected with chromosomal rearrangements.

798. JENSEN, K. A.,
KIRK, I. and
WESTERGAARD, M.
Mutagenic activity of some 'mustard gas' compounds.
Nature, Lond. 1950 : 166 : 1020-21.

The problem of the chemical mechanism involved in the mutagenic activity of the mustard gases has been approached at the Chemical Laboratory and Genetical Institute, Copenhagen University, by studying the effect of monochloro and dichloro nitrogen mustards on *Neurospora*, using the back mutation test (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 138) and an adenineless colonial double mutant as the test strain. The results do not support the view that the effect of the mustard gas molecule depends upon its ability to form cross

linkages with the protein, but have led to the conclusion that the ability to form the highly reactive iminium ion is the prerequisite for the biological activity of the mustard gas molecule and that the level of activity determines the level of mutagenicity as well as toxicity. As a working hypothesis it is suggested that the mutations are probably induced by the release of energy from the reactions of these very reactive compounds.

799. STEVENS, C. M. and
MYLROIE, A.
Mutagenic activity of beta-chloroalkyl amines and sulphides.
Nature, Lond. 1950 : 166 : p. 1019.

Experiments were carried out at the California Institute of Technology on two mutant strains of *Neurospora crassa* to study the effect of a series of β -chloroethyl amines and sulphides containing only one reactive grouping. The response of the two strains was different. In the case of one strain, an adenineless colonial double mutant, the monofunctional sulphur mustards were even more active in producing reversion to the non-deficient condition than mustard gas itself; monofunctional nitrogen mustards were also found to be more active than mustard gas when the effects of the compounds were compared at the concentration giving maximum activity. In the case of the other strain, an inositolless colonial double mutant, both the monofunctional and polyfunctional nitrogen and sulphur compounds exhibited only slight mutagenic activity. It is stressed that this demonstration of the mutagenic ability of substances of the monofunctional mustard type is of importance in the study of the mechanism by which mutations are induced.

EVOLUTION

800. PORTÈRES, R.
La variation parallèle. (**Parallel variation**).
Rev. Bot. Appl. 1950 : 30 : 468-81.

The concept of parallel variation is considered against its historical and philosophical background and the role of gene associations in phylogenetic evolution is discussed with some observations on the taxonomic levels at which variation of evolutionary significance may occur.

801. EPLING, C. and
CATLIN, W.
The relation of taxonomic method to an explanation of organic evolution.
Heredity 1950 : 4 : 313-25.

A general discussion is presented of the way in which taxonomic and genetic investigations may be integrated to throw light on the course of organic evolution.

802. DOBZHANSKY, T.
Mendelian populations and their evolution.
Amer. Nat. 1950 : 84 : 401-18.

The categories of practical systematics are distinguished from the underlying spatio-temporal entities, the latter being referred to as Mendelian populations. A Mendelian population is defined as a "reproductive community of sexual and cross-fertilizing individuals which share in a common gene pool." Different levels of Mendelian populations are considered, ranging from the biological species to the panmictic unit. The problems encountered in the delimitation of species, races and other Mendelian populations are examined and shown to be the inevitable outcome of the continuity of the evolutionary process. It is stressed that from the evolutionary standpoint the individual organism cannot be considered apart from the Mendelian population of which it is a member; and that Mendelian populations are, even to a greater extent than individuals, units of natural selection, and therefore of adaptation and evolutionary change. The adaptive role of

polymorphism in Mendelian populations and the process of speciation are discussed. A species is regarded as a reproductively isolated Mendelian population, speciation as a form of integration of Mendelian populations engendered by natural selection in response to the diversity of sympatric environments. Not only the presence but also the degree of reproductive isolation between species is determined by the exigencies of adaptive evolution; gene exchange between Mendelian populations is adaptively favourable or unfavourable, according to the measure of fitness of the products of recombination in relation to the environment. Speciation is an adaptive accompaniment of sexual reproduction, just as sexual reproduction is a corrective to the relative stability of the gene. In concluding, the author describes evolution as a creative process, in the sense that it involves the formation of previously non-existent coherent entities, and a free one, in the sense that it entails the possibility of failure.

803. HEDLUND, T.
A peculiar origin of biotypes.
 Bot. Notiser 1950 : No. 4 : 469-70.

New biotypes have occurred in the progenies of hybrids between biotypes in the genus *Malva* differing in only one gene affecting leaf form and laciniation. It therefore appears that crossing between different biotypes may in some way stimulate a gene mutation and thus result in a new biotype.

804. SCHREIBER, G. and
 PELLEGRINO, J.
 Eteropycnosi di autosomi come possibile meccanismo di speciazione.
(Heteropycnosis of autosomes as a possible mechanism in speciation).
 Scientia Genetica 1950 : 3 : 215-26.

From a study of heteropycnosis in various species and interspecific hybrids of *Triatoma* it is suggested that the occurrence of heteropycnotic regions in the autosomes may possibly be one of the factors concerned in speciation.

805. PORTÈRES, R.
 Vieilles agricultures de l'Afrique intertropicale. Centres d'origine et de diversification variétale primaire et berceaux d'agriculture antérieurs au XVI^e siècle. **(Types of ancient agriculture of tropical Africa. Centres of origin and of primary diversity and cradles of agriculture before the sixteenth century).**
 Agron. Trop. 1950 : 5 : 489-507.

In this historical study, from the botanical aspect, of various types of agriculture in prehistoric and more recent times in western and eastern Africa, the writer discusses the occurrence of the diverse wild and cultivated forms of rice, sorghums, millets, yams, *Coleus* spp., and oil plants, including species of *Polygala*, *Hyptis*, *Ceratotheca* and *Sesamum*. The steppe type of cereal cultivation and the ancient agriculture of the inundated plains, both found in western Africa, are also briefly treated. Madagascar had no ancient system of agriculture.

806. NETOLITZKY, F.
 Fragestellungen zur nacheiszeitlichen Geschichte heimischer Gewächse.
(Aspects of the post-glacial history of indigenous plants).
 Ber. dtsch. Bot. Ges. 1943 : 61 : 219-30.

In discussing various historical considerations relating to the European plant world in the post-glacial period, the author examines briefly the relation between man and the plant kingdom and the possible influence of human activities, as a factor conducing to mutation and ultimately to the production of cultivated forms of plants.

807. MULDAL, S. and
VALENTINE, D. H.
Cytology, genetics and classification.
Nature, Lond. 1950 : 166 : 769-71.

An account is given of the discussion on "Cytology and genetics in relation to the classification of plants and animals," arranged by the Zoology and Botany Sections of the British Association and held on 4 September, 1950 at Birmingham. The papers presented included the following:—

L. Sachs dealt with cytogenetics in relation to the systematics and phylogeny of the Triticinae. Different modes of approaching the problems of this group were discussed and illustrated, comprising gross morphology, chromosome number and morphology, chromosome pairing and fertility in interspecific and intergeneric hybrids, chromosome pairing and fertility in colchicine induced amphidiploids, the genetic behaviour of certain characters, and the attempted artificial synthesis of existing species. The genome concept was examined, and evidence was presented to show the desirability of revising the accepted genome formula for *Triticum Timopheevi*. In discussing interspecific and intergeneric amphidiploids, it was suggested that, although some of these are morphologically distinct and reproductively isolated, they should not be given new specific or generic names but formulae in order to show their experimental origin. The approach of comparative genetics was illustrated by the action of interspecific and intergeneric lethals and sub-lethals associated with a hexaploid species of *Triticum*.

Finally, the evolution of the genera comprising the Triticinae was discussed; the view was expressed that each of the five genera has evolved in its own way, by immediate speciation due to polyploidy or the presence of interspecific lethals, or by gradual speciation brought about by accumulation of genic and chromosomal changes.

T. J. Jenkin described his experimental work on *Lolium* and *Festuca*. Two groups of species, both diploid ($2n = 14$), can be distinguished in *Lolium*: one, self-pollinated, comprises *L. temulentum*, *L. remotum* and *L. loliaceum*; the other, cross-pollinated, contains *L. perenne*, *L. rigidum* and *L. italicum*. Within each group more or less fertile interspecific hybrids can be made; viable hybrids between the two groups can also be secured. Among factors which may have been responsible for speciation, human selection for seed size in *L. temulentum*, a weed of cereals, and in *L. remotum*, a weed of flax, was mentioned as a possibility. *Festuca* contains polyploid as well as diploid species. Two groups, one consisting of narrow leaved forms and the other of broad leaved forms, can be distinguished. Hybridization within each of these groups is possible, although the hybrids are often male sterile. But the only hybrid between the two groups so far obtained is *F. rubra* ($2n = 42$) x *F. arundinacea* ($2n = 42$); this hybrid is vegetatively weak and has never flowered. Both *L. perenne* and *L. loliaceum* have been successfully crossed with members of both groups of *Festuca*.

F. C. Stern dealt with the value of chromosome number and other cytological features in solving taxonomic and phylogenetic problems, referring to *Paeonia*, *Primula* subsection *Eufarinosae*, *Galanthus*, *Leucojum*, *Crepis*, *Yucca* and *Agave*.

E. K. Janaki-Ammal continued the theme of the correlation between morphology, chromosome number and geographical distribution, with a paper on polyploidy in *Rhododendron*.

D. H. Valentine discussed the use of interspecific compatibility as a taxonomic criterion, refining and evaluating the term comparium, first proposed by Danser in 1929. A comparium is described as a group comparable in size with a genus or subgenus, composed of all those species which can be united, directly or indirectly, by hybridization. In order to analyse relationships within or between comparia, it was suggested that variation in seed compatibility, i.e. the ability to form a hybrid embryo, seed and seedling, could be used, except in cases of relationships between diploid and tetraploid species.

* General studies, see also individual crops.

808. NICOLA, M. DE.

Azione dei raggi X sul metabolismo degli acidi nucleici in cellule proliferative e cellule secrete. (**Action of X-rays on the metabolism of nucleic acids in proliferating cells and secretory cells**).
Experientia, Basel 1950 : 6 : 432-33.

The results of irradiation of the gonads of *Asellus aquaticus* have led the author to conclude that: (1) the action of X-rays is essentially specific for the nucleic acids and not for intermediate substances evolved in the course of their metabolism; and (2) stickiness, mitotic metaphase block and chromosome abnormalities are a secondary effect of the altered nucleic acid metabolism.

809. STACEY, M.

Chemistry of the cell and its nucleus.
Nature, Lond. 1950 : 166 : 771-72.

Summaries are given of papers contributed to the meeting on "The chemistry of the cell with special reference to the nucleus," arranged by the Botany Section of the British Association and held on 1 September, 1950 in Birmingham.

M. Stacey opened the discussion with a paper on the chemical composition of some cell nucleoproteins. The desoxypentose nucleic acids and pentosenucleic acids form two distinct groups of nucleic acid, with marked differences in physical and chemical structure shown by the products from different cells. Although the desoxypentose type is found mainly in nuclear structures and the pentose type mainly in cytoplasmic material, it is becoming evident that at different stages of cell growth considerable overlap exists in the location of the two groups of nucleic acid, especially in the bacteria. Other topics discussed included: the position of the magnesium ribonucleoprotein which forms the dye-retaining part of the surface structure of Gram positive microorganisms; and the behaviour of the nuclear proteins under the influence of cell autolytic enzymes. The new observation was made that only a small part of the ribonucleic acid of various cells is bound in the Gram complex.

W. G. Overend dealt with work on the fundamental chemistry of the Feulgen and Dische reactions.

F. L. La Cour discussed some aspects of investigations on heterochromatin in plants at the John Innes Horticultural Institution. Heterochromatin can be made clearly visible at metaphase by working at relatively low temperatures. Particularly interesting results have been obtained with New and Old World species of *Fritillaria*; it has been found that heterochromatin maps make possible the recognition of species and hybridity. It is suggested that heterochromatin is probably concerned with the transfer of gene products to the cytoplasm.

I. Leslie concluded the session with a paper on recent work carried out at Glasgow University on the role of the cell nucleus in the biochemistry of tissue growth.

810. SWIFT, H.

The constancy of desoxyribose nucleic acid in plant nuclei.
Proc. Nat. Acad. Sci. Wash. 1950 : 36 : 643-54.

Photometric determinations of desoxyribose nucleic acid were carried out on non-dividing and dividing tissues in maize and *Tradescantia* and during meiosis in *Tradescantia*, using Feulgen stained material. The analysis showed that desoxyribose nucleic acid occurs in well marked units characteristic of the strains or species; the quantities involved are thus directly associated with the genotype. Nuclei with 2, 4, 8, 16 or 32 times the haploid value were found. Preceding mitosis, the desoxyribose nucleic acid increases during interphase to twice the diploid amount; in meiosis the amount is reduced so that the microgamete contains half the diploid value.

811.

El contenido nucleoproteico del núcleo celular. (**The nucleoprotein content of the cell nucleus**).

Ciencia e Investigación, B. Aires 1950 : 6 : 319-20.

The discordant results obtained for the ratio of protein to nucleic acid in the nucleus by the methods of direct chemical analysis of isolated nuclei and light absorption are discussed, the low ratios obtained by the former method being attributed to washing away of protein during isolation.

812.

SATO, D.

A diploid plant with only one nucleolus and its bearing on the balance hypothesis of nucleolar chromosomes.

Bot. Mag. Tokyo 1941 : 55 : 159-63. [from Heredity 1950 : 4 : p. 393].

The diploid species *Brodiaea uniflora* ($2n = 12$) has a single nucleolus and one SAT chromosome. It is thought that the activity of this chromosome in organizing its nucleolus inhibits the other chromosomes from so doing.

813.

MARQUARDT, H.

Neuere Auffassungen über einige Probleme aus der Pathologie der Kernteilung. (**Newer ideas on some problems of the pathology of nuclear division**).

Naturwissenschaften 1950 : 37 : 416-24, 433-38.

The possible types of injury to the nucleus and methods of analysing chromosome breaks are described. A survey is given of previous research and the theory relating to the cause of breaks. Later experiments on the effects of combining different agents, e.g., temperature, X-rays, various gases and ultraviolet and infrared rays, on the production of breaks are described. The results of this work are shown to have made the idea of the potential break dubious as a basis for explaining the cause of breaks. Experiments with chemical substances which induce breaks are described. Consideration of the results from these experiments and from the above mentioned work on combined agents shows the need for elaboration of the theory hitherto used in interpreting the phenomena of chromosome breaks. Factors which have led to this conclusion are (1) the absence of uniformity in the nature of potential breaks and their dependence on the physiological state of the cell and (2) the possibility of producing breaks indirectly as a result of the formation of metabolic products capable of causing breaks.

The author's new interpretation of experimentally induced phenomena involving the recombination of breaks consists in taking the processes, hitherto regarded as occurring in spontaneous phenomena, as basic mechanisms applicable also to the case of experimentally induced chromosome mutation. In the new theory, breaking of the chromosome is held to be closely connected with the metabolism of the cell.

814.

MANTON, I.

The spiral structure of chromosomes.

Biol. Rev. 1950 : 25 : 486-508.

Literature on the spiral structure of the chromosomes in plants is reviewed under the headings: range of types studied; methods of demonstration of the spiral; numerical attributes of the spiral; the minor spiral; prophase development; gyre elimination; direction of coiling; geometrical form of the spiral, paranemic or plectonemic; telophase and relational coiling; and the origin and significance of the spiral. Unification of terminology is recommended by the general adoption of the terms plectonemic and paranemic to describe the geometrical form of the spiral; and use of the term standard coil for the minor spiral is proposed. Emphasis is laid upon the interpretation of the telophase split and of the origin of relational coiling for an understanding of the functional significance of the phenomena of spiral structure. The author repeats the suggestion made by her in earlier

publications, viz. that the functional significance of the spiral may be coordination of the spatial relations of the component strands of the chromosome during mitosis and meiosis. The list of references cited comprises a general bibliography and selected bibliographies for the genera *Tradescantia*, *Trillium* and *Osmunda*; as far as possible, citation of the Japanese literature is complete.

815. HAGA, T.
(Chromosome studies by means of X-irradiation).
Jap. J. Genet. 1940 : 16 : 23-35.

A general review on the ways in which X-irradiation has been used to elucidate chromosome structure and behaviour is presented in Japanese.

816. WARTERS, M. and
GRIFFEN, A. B.
The telomeres of *Drosophila*.
J. Hered. 1950 : 41 : 183-90.

Satisfactory cytological proof of the existence of telomeres, or unipolar terminal chromomeres in the salivary gland chromosomes of *D. melanogaster* and *D. virilis* has been obtained. Like the centromeres, the telomeres do not reduplicate during nuclear growth but maintain their original number of two for each end of each homologous chromosome. No evidence of the presence of terminal inert or heterochromatic material in the cytological sense of these terms was found; nor was any indication of synaptic attraction between the terminal regions of the chromosomes other than the telomeres obtained. The subterminal structural strength of each chromosome determines the ease with which the chromosomes are separated from the cluster formed as a result of telomere synapsis, and from each other upon smearing. All the telomeres are regarded as fundamentally similar and probably identical.

817. SMITH-WHITE, S.
Cytological studies in the Myrtaceae. III. Cytology and phylogeny in the Chamaelaucoidae.
Proc. Linn. Soc. NSW 1950 : 75 : 99-121.

Haploid chromosome numbers of 6, 8 and 11 are reported in the Chamaelaucoidae. It is suggested that 6 is the basic chromosome number of the tribe and that the latter is not derived from the Leptospermoideae in which 11 appears to be the basic number. The Myrtoideae may have arisen independently from the two tribes cited above. Pollen fertility in the genus *Darwinia* was frequently low. It is suggested that this is consequent, not on hybridization, but on small population size.

818. SPARROW, A. N. and
MALDAWER, M.
Differential rejoining as a factor in apparent sensitivity of chromosomes to X-ray breakage.
Proc. Nat. Acad. Sci. Wash. 1950 : 36 : 636-43.

Differential rejoining has been investigated in microspores of *Trillium erectum* following X-irradiation at stages of high and low sensitivity to chromosome breakage, i.e. at first meiotic metaphase and early postmeiotic interphase respectively. The numbers of dicentric and rings at microspore anaphase were used as a criterion of rejoining. A significantly higher amount of rejoining occurred in cells irradiated at early interphase than in those treated at meiotic metaphase. The increase in rejoining was not however sufficient to account for the decreases in fragmentation. It is therefore concluded that the observed difference in sensitivity at the two stages is partly due to a difference in number of primary breaks and partly to a difference in the amount of rejoining which occurs

subsequently. A high sensitivity to primary breakage was associated with a low frequency of rejoining and *vice versa*. The bearing of these results on calculations of mutation rate and gene size is examined.

819. THODAY, J. M.
Ionizing radiations and chromosomes.
 Abstr. Diss. Univ. Camb. 1948-49 (1950) : 18-19.

The effects of different doses of X-rays and α -rays on the chromosomes of *Vicia* were investigated in an experiment designed to meet criticisms of the "direct target" theory, on the grounds that allowance has not been made for the effects of treatment on the timing of mitosis. Nine different fixation times, ranging from $1\frac{1}{2}$ to 48 hours were used. Data obtained agreed with those published by workers using single fixation times in *Tradescantia* experiments, with the exception that breaks involving both chromatids at the same locus and showing sister union are found in numbers proportional to the (X-ray dose)^{1.5}. This proves that the radiations break the chromosomes primarily by "direct" action; evidence that radiation may influence the reunion of broken chromosomes by an "indirect" action also exists.

820. ALLEN, N. S.,
 WILSON, G. B. and
 POWELL, S.
Comparative effects of colchicine and sodium nucleate on somatic chromosomes of *Allium* and *Tradescantia*.
 J. Hered. 1940 : 41 : 159-63.

Separation of somatic chromosomes, as distinct from chromatids, into two or more groups within a single cell is a phenomenon induced by numerous chemicals; such separation apparently occurs without the intervention of a normal spindle mechanism. The chemicals may be divided into two arbitrary groups: so-called mitotic poisons such as colchicine, and physiological substances of which sodium nucleate is typical. A comparison is made between the effects of colchicine and sodium nucleate upon the nuclei in root tip cells of *Tradescantia* and *Allium*, with reference to chromosome arrangement, frequency of reductional groupings, chromosome distributions, types of groupings and ratio of "prophases" to "metaphases." The major differences between the effects of the two substances are as follows: the peripheral arrangement of fully contracted chromosomes frequently observed after treatment with colchicine; the relatively high incidence of prophase reductional groupings after treatment with sodium nucleate; and a significantly higher proportion of equal groupings in separations induced by sodium nucleate than in those resulting from colchicine treatment. It is stressed that whether or not the basic mechanism of separation of somatic chromosomes is the same in the case of all substances is not yet known. The answer to the problem, it is thought, may emerge from a comparative study of the differential responses to various treatments shown by the "forces" involved in the spindle mechanism.

821. GILES, N. H. (JUN.) and
 BEATTY, A. V.
The effect of X-irradiation in oxygen and in hydrogen at normal and positive pressures on chromosome aberration frequency in *Tradescantia* microspores.
 Science 1950 : 112 : 643-45.

Inflorescences of *Tradescantia* were exposed to X-irradiation in atmospheres of 0% oxygen (pure helium) and 2%, 5% and 10% oxygen plus helium at normal atmospheric pressure. The X-ray dosage was in all cases 400 r. at 50 r./min. Special attempts were made to remove as much oxygen as possible from the inflorescences before irradiation. A substantial frequency of chromosomal aberrations was obtained even in the complete, or

nearly complete, absence of oxygen. A rapid rise in frequency of aberrations occurred when oxygen was present, compared with the frequency resulting from X-ray treatment in the absence of oxygen. This increase was linear between 0% and 10% oxygen, after which the rise was apparently more gradual. The increase exhibited a definite levelling off at about 20% oxygen (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1396). The results of X-irradiation experiments, in which the above oxygen-helium gas mixtures were used at pressures of 1, 2 and 3 atmospheres above normal, indicated that pressure did not affect the production of the chromosomal aberrations under investigation, viz. interchanges and interstitial deletions.

It has been suggested by Thoday and Read (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 762) that the effect of oxygen in increasing the frequency of chromosomal aberrations may result from an indirect action of X-irradiation in decomposing water with the production of hydrogen peroxide. The problem of the mode of origin of X-ray induced aberrations in the absence of oxygen has however to be considered. Possibly such aberrations might result, at least partly, from breaks produced by the OH radical formed by the radio-decomposition of oxygen-free water; or they might arise from the direct action of the radiation in ionizing the molecules of the chromosomes themselves. A preliminary attempt has been made to distinguish between these two possibilities by carrying out experiments designed to remove the OH radical by promoting, during X-ray exposure, the back reaction to form water. Inflorescences were therefore irradiated in pure hydrogen at normal pressure and at three atmospheres above normal. Some decrease occurred in the aberration frequency compared with the results obtained with irradiation in helium only; but the differences for the most reliable observations, those on interchanges, were not significant. This result therefore supports the latter of the above two possibilities.

822. SPARROW, R. C. and
SPARROW, A. H.

Spontaneous chromosome fragmentation in *Trillium erectum* L.
Amer. Nat. 1950 : 84 : 477-88.

In studying the frequency of spontaneous chromosome fragmentation in *T. erectum*, counts were made of fragments at first anaphase and microspore metaphase and of micronuclei at the quartet stage and microspore interphase. Analyses of micronuclei at microspore interphase in 15 plants revealed no significant difference between the buds of a single plant or anthers within a bud. The plants fall however into two statistically significant groups, with mean frequencies of 0.666 and 2.908 micronuclei per 100 microspores. The presence of spontaneously occurring fragments points to the necessity of adequate control material in experiments in which low dosage radiation is used. No significant difference in aberration frequency was found at anaphase I, the quartet stage and microspore metaphase. It therefore appeared that the value obtained at any one of these stages can be used as a control estimation of spontaneous fragmentation. At microspore interphase however the frequency of aberrations was three times higher than that of any of the other three stages; the reason for this significantly higher frequency is not understood.

823. BIESELE, J. J. *ET AL.*

Chromosome alteration and tumour inhibition by nitrogen mustards : the hypothesis of cross-linking alkylation.
Nature, Lond. 1950 : 166 : 1112-13.

LOVELESS, A. and
ROSS, W. C. J.

Chromosome alteration and tumour inhibition by nitrogen mustards : the hypothesis of cross-linking alkylation.
Ibid. 1950 : 166 : 1113-14.

The hypothesis has been advanced that the radiomimetic activity of nitrogen mustards depends on the presence of two reactive groups in the mustard molecule. It has been further suggested that chromosome bridging and breakage, resulting from treatment with mustards, are a direct consequence of interchromatid cross linkage by single polyalkylating

molecules (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2354 and Vol. XX, Abst. 747). Such a mechanism of chromosomal alteration, the present authors suggest, could be considered as a plausible explanation of the effective action of nitrogen mustards and certain other polyfunctional molecules, such as polyethylenimines and diepoxides, against mammalian tumours. Recent studies of a number of monofunctional compounds related in structure to nitrogen mustards and diepoxides, however, raise some questions concerning the validity of this hypothesis on the nature of chromosome damage; the investigations have been carried out at the Sloan-Kettering Institute for Cancer Research, New York City. Structural alterations in chromosomes resembling those produced by polyfunctional nitrogen mustards have been obtained by treating root tips of *Allium Cepa* with appropriate monofunctional agents. In addition, the capacity of monofunctional compounds to damage proliferating cells has been demonstrated in animal material *in vitro* and *in vivo*. The monofunctional agents could not possibly elicit radiomimetic effects in chromosomes and proliferating cells by a mechanism involving cross-linking alkylation. The results do not negate the possibility that the polyfunctional alkylating agent may effect radiomimetic action through a cross linkage of vital fibrous molecules. The authors express the view, however, that the radiation-like activity of the compounds under discussion is more likely to be due to the possession of molecular configurations with similar chemical properties, viz. unstable 3-membered heterocyclic radicals. It is pointed out that no molecular class having the radiomimetic activity of nitrogen mustards both *in vitro* and *in vivo* is known to the authors which does not contain this configuration either in the parent compound or in some active transformation product.

Loveless and Ross write that similar results as those reported by Biesele *et al.* have been obtained at the Chester Beatty Research Institute, London, the ability of certain monofunctional alkylating agents to produce chromosome damage and inhibition of tumour growth having been observed. An examination of the literature, however, indicates that monofunctional compounds are less effective in their radiomimetic action than difunctional compounds of a like chemical character. In work on types of polyfunctional compounds other than nitrogen mustards at the institute, radiomimetic effects have been produced by 1 : 4-bis-methanesulphonoxybutane $\text{CH}_3 \cdot \text{SO}_2 \cdot \text{O} \cdot (\text{CH}_2)_4 \cdot \text{O} \cdot \text{SO}_2 \cdot \text{CH}_3$ and dimethyl sulphate. These compounds cannot form three-membered rings, but can react by a carbonium ion mechanism, as also can epoxides, ethylenimines and the sulphur and nitrogen mustards. The ability to produce carbonium ions is thus regarded as a more general feature of this group of radiomimetic agents than the ability to produce a compound containing an unstable three-membered ring system.

824. MALHEIROS-GARDÉ, N.
Algunos efectos de la morfina en la mitosis de la *Luzula purpurea* Link.
(Some effects of morphine on mitosis in *L. purpurea* Link).
Genetica Iberica 1950 : 2 : 29-38.

Morphine induces tetraploidy and chromosome fragmentation in *L. purpurea*.

825. SAMPAYO, T. M.
Acción de la quinoleína sobre la mitosis radicular de *Allium Cepa* L.
(Action of quinoline on root mitosis in *A. Cepa* L.).
Genetica Iberica 1950 : 2 : 53-74.

Quinoline induces c-mitosis, c-tumours and stickiness in *A. Cepa* roots. Roots replaced in water after treatment showed chromosome fragments and multinucleate cells.

826. KOSTOFF, D.
Homozygous translocation obtained in the second generation
from material treated with neutrons.
Proc. Indian Acad. Sci. 1949 : 30 : 259-62.

Treatment of dry seeds of *Crepis capillaris* with neutrons has resulted in cytological abnormalities similar to those induced by X-rays. These abnormalities can be classified as

(1) chromosomal dislocation in the form of translocation, deficiency, fragmentation and production of chromosomes with two centromeres, (2) heteroploidy and (3) polyploidy. About 7% of the dividing cells possessed abnormal karyotypes on the second day of germination of the material treated with neutrons. The various translocations induced are briefly described. One of these translocations was studied in the succeeding generation. This was a translocation from one D chromosome to the short arm or head of one A chromosome. The short end of D, following translocation, was designated d, and the resulting elongated arm of chromosome A termed Ad'. Normal individuals and the plant heterozygous for the translocation have the chromosome formula AACCDd and AAd'CCDd, respectively. The latter plant produced about 28.1% abortive pollen. Of the plants raised from selfed seed of this heterozygote ten were studied cytologically. Only one was homozygous for the new karyotype (Ad'Ad'CCdd); four were normal and four heterozygotes of the constitution AAd'CCDD; the chromosomal constitution of the remaining plant was not determined with certainty. Similar translocations of the type AAd'CCDd occasionally occur in nature. The production of this plant homozygous for the new karyotype throws light on the natural mode of karyotypic evolution. In the case reported, a homozygous karyotype with one pair of chromosomes having almost equal arms has been produced, in contrast to the original plant in which one pair of the chromosomes concerned possessed heads; this is the reverse of the natural process of translocation postulated by Levickii.

827. FERNANDES, A.
Le problème de l'hétérochromatinisation chez *Narcissus Bulbocodium* L.
(The problem of heterochromatinization in *N. Bulbocodium* L.).
Bol. Soc. Broteriana 1949 : 23 : Sér. 2.a : 5-88.

The writer's past research has been largely concerned with the problem of whether certain plants can control their amount of active chromatin, a faculty which would protect them from genic disequilibrium resulting from polysomy.

The present paper presents a full account of work dealing with the occurrence and nature of heterochromatinosomes in *N. Bulbocodium* (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2374). Heterochromatinization of the supernumerary chromosomes is conditioned by a dominant gene *H* which occurs in some wild populations and controls the amount of active chromatin. 1 *H* is dominant to 2 *h* but *H* may have a different valency in different wild populations, and strong, intermediate and weak races may occur. Plants bearing *H* are protected from genic disequilibrium. Heterochromatinization is an irreversible process. Heterochromatin, being merely inactivated euchromatin, is unlikely to be concerned in the regulation of the nucleic acid metabolism of the nucleus, nor, in the author's opinion, are the heterochromatinosomes likely to have any selective value for evolution.

828. MELLO SAMPAYO, T. and
CASTRO, D.
Colchicine-induced tetraploidy in *Luzula purpurea* Link.
Nature, Lond. 1950 : 166 : 1114-15.

A tetraploid ($2n = 12$) has been induced in *L. purpurea* by treating the aerial parts of seedlings with 0.5% colchicine solution. Its chromosome behaviour has been found to be generally similar to that reported by Malheiros *et al.* (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 756), meiosis I being an equational division and meiosis II reductional.

829. OLTMANN, W.
Die Herstellung polyploider Pflanzen mit Hilfe von Colchicin-Injektionen. (The production of polyploid plants by means of colchicine injections).
Züchter 1950 : 20 : 209-10.

In this method, a 0.5-0.75% aqueous colchicine solution is hypodermically injected into any aerial part, but preferably in the lower portion, of the plant, so that the transpiration stream will carry the colchicine to the growing point; in such a position the danger of

diploid sectors sprouting too is lessened. In monocotyledons the injection should be made into the growing point above the adventitious roots, thus ensuring that fruits developing later will generally be polyploid.

830. SCHWANITZ, F.

Untersuchungen an polyploiden Pflanzen. IX. Über den Gehalt der Blätter diploider und tetraploider Gartenstiefmütterchen (*Viola tricolor maxima* hort.) an Calciumoxalatdrusen. [**Investigations on polyploid plants. Part IX. On the numbers of clustered crystals of calcium oxalate in the leaves of diploid and tetraploid cultivated pansies (*Viola tricolor maxima* hort.)**].
Züchter 1950 : 20 : 208-09.

Leaves of tetraploid cultivated pansies have fewer clustered crystals of calcium oxalate per unit area than the leaves of diploid pansies; the volume and diameter of the cluster are also less in the tetraploid. As a result, the tetraploid leaves contain only 41.9% of the amount of calcium oxalate present in diploid leaves. The causes of the lower calcium oxalate content in the tetraploid are decreased transpiration, lower osmotic pressure and lower suction pressure in the roots, all tending to reduce the intake of nutrients; in addition the decrease in permeability due to increase in the cell volume in the tetraploid plays its part.

831. SCHWARZE, P.

Polyploidieeffekte bei *Datura tatula*. (**Polyploidy effects in *D. tatula***).
Ber. dtsch. Bot. Ges. 1949 : 62 : 113-14.

The morphological and physiological effects of polyploidy, including changes in yield are discussed, and the possible causes of the increased alkaloid content observed in polyploid forms are also examined. The author favours an explanation in line with Mothes and Hieke's theory that the root is the site of alkaloid formation in *Nicotiana* (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1107).

832. SCOTT, F. I.

Polyploidy among plant species extraneous in Indiana.
Butler Univ. Bot. Stud. 1950 : 9 : 176-87.

A study was made of the distribution of polyploidy among plant species extraneous in Indiana to discover whether any relationship exists between polyploidy and geographical distribution in this region. Only among monocotyledonous species was an association found between polyploidy and increased adaptability.

833. ERNST, H.

Zytogenetische Untersuchungen an haploiden Pflanzen von *Antirrhinum majus* L. I. Die Meiosis. (**Cytogenetic investigations on haploid plants of *A. majus* L. I. Meiosis**).
Z. Bot. 1940 : 35 : 161-90.

The question investigated was whether the pairing observed in haploid *Antirrhinum* plants with 8 chromosomes was due to homology between individual chromosomes or to pairing between non-homologous chromosomes. From the cytological behaviour of the eight chromosomes which exhibited both types of pairing, in haplomeiosis, the writer thinks that the genus *Antirrhinum* derives from a form with either $n = 7$ or $n = 6$ chromosomes.

834. TIWARY, N. K. and
SHRIVASTAVA, S.

A new fixative for differential staining of pollen grain.—III.
Sci. and Cult. 1950 : 15 : p. 364.

The nuclei of pollen grains have been found to stain better with acetocarmine if stored the previous night in a mixture of nine parts of N/NaOH in absolute alcohol to one part of sulphuric ether.

835. GREGG, J. R.
Taxonomy, language and reality.
Amer. Nat. 1950 : 84 : 419-35.

Recent discussions by Burma and Mayr (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 843) have reopened the old controversy whether species are real. Prompted by this revival of the controversy the author gives a semantic analysis of the species and other taxonomic categories.

***DISEASES, INJURIES, BACTERIA, FUNGI**

836. KADEK, M.
(The tasks of the Academy of Sciences of Latvian SSR for 1950).
Latv. PSR Zinātņu Akad. Vēstis 1950 : No. 1 : 33-39.

The programme includes continued study of the effect of external conditions upon microorganisms and selection work with yeasts.

837. NEWCOMBE, H. B. and
NYHOLM, M. H.
Anomalous segregation in crosses of *Escherichia coli*.
Amer. Nat. 1950 : 84 : 457-65.

Segregation of the linked group of loci, *S*, *Gal*, *Ara*, *Xyl* and *Mal* in crosses of *E. coli* is such that these cannot be arranged in linear sequence by the usual methods. The above loci affect streptomycin reaction and fermentation of galactose, arabinose, xylose and maltose respectively. Assuming that no exceptional chromosomal phenomenon is involved, this anomalous segregation appears to be due to an excess of double crossovers too great to be attributable to irregularities in chromosome pairing; as such it cannot have originated by a selective mechanism tending to eliminate single cross overs, as could occur in the cases of a ring chromosome, combination of lethal genes on the same chromosome and an inversion. This negative interference in crossing over is approximately operative in all chromosome regions tested; theoretical consideration is given to several possible causes of the anomalous behaviour.

838. HINSHELWOOD, C.
Chemistry and bacteria.
Nature, Lond. 1950 : 166 : 1089-92.

The possible chemical nature of bacterial adaptation to drugs and other substances is analysed; and the problem of adaptive changes is examined in the light of chemical explanations and the mutation theory. Several arguments are put forward against the hypothesis of mutation and the general conclusion is reached that chemical hypotheses on the mode of adaptation provide a more satisfactory explanation. It is emphasized that unicellular organisms differ from complex animals and plants in important ways, since they are directly exposed to the action of the environment and all their chemical reactions are subject to the direct intervention of any substances that the medium may contain; heritable modifications in bacteria must therefore be approached differently from those occurring in complex organisms.

839. HUNTER, M. C.,
STAHL, G. L. and
MYERS, W. G.
Variations on *Listeria monocytogenes* produced by beta particles from radiophosphorus.
Ohio J. Sci. 1950 : 50 : 253-59.

Nineteen different strains isolated from a suspension of *L. monocytogenes* after exposure to radiation resembled the parent strain in general cell morphology, motility and the

* General studies, see also individual crops.

possession of some common antigen, but changes involving loss of metabolic ability and pathogenicity were frequent. Additional enzymatic activity, absent in the parent strain, was observed in two strains, which may have been due to the loss of inhibitors. Five different strains with altered pathogenicity also showed similarities in the loss of the capacity for several metabolic reactions; this may have been caused by a single β particle striking a focus of genetic determinants or the alteration of a single gene affecting several enzyme systems.

840. SCHNEIDER, L. K.
Population dynamics in *Escherichia coli*.
 Biol. Bull. 1950 : 99 : p. 331. (Abst.).

The mutation from histidine dependence (h-) to histidine independence (h+) in *E. coli* has been shown to be spontaneous by the method of variance analysis developed by Luria and Delbruck.

Information is given on the equilibrium ratios between h+ and h- forms reached in different cultures and of the selection pressures exerted.

841. CAVALLI, L. L. and
 MACCACARO, G. A.
Chloromycetin resistance in *E. coli*, a case of quantitative inheritance in bacteria.
 Nature, Lond. 1950 : 166 : 991-92.

A completely gradual increase of resistance to chloromycetin has been found in *Escherichia coli* K-12. The increase in resistance is two fold or lower, on the average, at every transfer in liquid culture; resistance is relatively stable on repeated subculture in the absence of chloromycetin. Data are given in support of the hypothesis that gradual resistance to chloromycetin is controlled by many genes with cumulative action. Bacteria with first step resistance to chloromycetin, obtained by both plate and test tube selection methods, were analysed in crosses of sensitive with resistant bacteria and of resistant with resistant forms; they showed a clear-cut segregation of sensitivity or resistance, within experimental error.

842. DIANZANI, M. U.
Mutation in the enzymatic equipment of *Escherichia coli* and *Proteus* OX 19 directed by desoxyribonucleic acid isolated from bacteria of the same and of different species.
 Experientia, Basel 1950 : 6 : 332-34.

Mutations in enzymatic characteristics have been obtained in one strain of *E. coli* by treatment with the nucleoprotein fraction of other *E. coli* strains and of *Proteus* OX 2, *Salmonella typhi murium* and *S. newport*. Mutations in enzymatic characteristics were also observed in *Proteus* OX 19 by treatment with the nucleoprotein fraction of *Proteus* OX 2 and strains of different species.

843. KLECZKOWSKA, J.
A study of phage-resistant mutants of *Rhizobium trifolii*.
 J. Gen. Microbiol. 1950 : 4 : 298-310.

Phage resistant mutants were isolated from strains of *Rh. trifolii* by treatment with phage culture. Mutation to phage resistance tended to coincide with mutations in other features, such as morphology of colonies or effectiveness in nitrogen fixation. The accompanying mutations had an independent origin and their frequency varied widely from strain to strain. The mutant morphological characters in colonies of derivative strains remained stable during a period of up to three years' propagation on laboratory media, whereas after a single passage through the host plants most of the strains assumed the appearance of the

parental strains. This result suggests that strong selection against colony mutants is operative in nodule tissue. The mutant types differing from the parent strain in effectiveness in nitrogen fixation showed marked differences in stability; mutants derived from one of the original strains remained unstable even after several successive replatings or passages through nodules. It is considered possible that phages may increase the proportion of strains with ineffective nitrogen fixation in the soil under certain conditions; in this connexion it is pointed out that ineffective phage resistant mutants are much more readily developed from effective parent strains than from ineffective strains.

844. LINDFORS, TH.
Aggressiva raser av potatiskräftsvampen. (Virulent races of the potato wart fungus).
 Växtskyddsnotiser 1950 : No. 2 : 17-18.

The problem set for Swedish potato breeders by the appearance in Germany of new biotypes, G and SB, of the fungus causing wart disease is discussed, with recommendations as to the best means of preventing their entry into and subsequent spread in Sweden. If a supply of infection material could be obtained all potato stocks in Swedish plant breeding institutes should be tested for resistance to the new biotypes, as is now done regularly for the others.

845. ROPER, J. A.
Search for linkage between genes determining a vitamin requirement.
 Nature, Lond. 1950 : 166 : 956-57.

It is emphasized that the question whether genes are distributed at random between and along the chromosomes or show some systematic arrangement related to their function in the biochemistry and morphogenesis of the organism is by no means settled. A working hypothesis for the basis of the search for linkage has been proposed by G. Pontecorvo, viz. that close linkage might be expected between some of the genes conditioning any one series of millimicromolar biochemical reactions. A search for linkage prompted by this hypothesis has led to positive results in experiments on three mutant strains of *Aspergillus nidulans*. Each of these strains requires biotin or desthiobiotin for growth but does not respond to pimelic acid. Each strain differs from the wild type by a single allele. The three alleles involved are not allelomorphous but are located in a chromosome segment about 0.2 morgan in length. Information is given on the order and distances of three genes relative to one another and to the locus γ for spore colour. Further mutants requiring other vitamin-like substances are being investigated for linkage.

846. LOVELESS, A. R.
The biology of *Sclerotinia trifoliorum* Eriksson.
 Abstr. Diss. Univ. Camb. 1948-49 (1950) : 13-14.

When an isolate of *S. Trifoliorum* (clover rot disease) was coinoculated with *S. Trifoliorum* var. *Fabae* on the same plate, the formation of an incompatibility line confirmed the former separation of the var. *Fabae* on spore size differences. "Demarcation lines" formed between coinoculations of isolates belonging to the same variety indicate that both *S. Trifoliorum* and *S. Trifoliorum* var. *Fabae* constitute a diverse range of biotypes, for which heterocytosis is suggested to be responsible.

847. ATWOOD, K. C.
The homology patterns of induced lethal mutations in *Neurospora crassa*.
 Biol. Bull. 1950 : 99 : p. 332. (Abst.).

Lethal mutations independently induced by ultraviolet irradiation were tested for homologies. Out of 155 mutants 85.3% showed the non-homologous reaction. The

homologous reactions found did not appear to represent cases of corresponding allelism. Certain mutants, however, appeared to be simultaneously homologous with a large number of others which were mutually non-homologous. It is suggested that the occurrence of such mutations can be interpreted in either of two ways: (1) large chromosomal deficiencies overlap many smaller separate deficiencies or many loci, in which case the minimum number of loci required for the observed pattern of mutation must be slightly greater than the number of mutants tested; or (2) the homologies are only apparent, in which case a number of loci equal to the number of mutants tested must be postulated. Whichever interpretation is the more acceptable, the data indicate that the number of loci in *Neurospora* is very large.

848. MAEDA, T.
(Genetical investigations on *Neurospora*).
 Jap. J. Genet. 1941 : 17 : 175-83.

An account of Lindegren's researches on *Neurospora* genetics is given in Japanese.

849. FOX, A. S. and
 GRAY, W. D.
**Immunogenetic and biochemical studies of *Neurospora crassa*:
 differences in tyrosinase activity between mating types of strain
 15300 (albino-2).**
 Proc. Nat. Acad. Sci. Wash. 1950 : 36 : 538-46.

The two mating types of strain 15300 (albino-2) differ in ability to produce melanin; the difference is due to the presence of a tyrosinase exhibiting both monophenol and polyphenol oxidase activity in 15300a and the absence of this tyrosinase in 15300A. Probably the difference is genetically determined; further work is being carried out to study the association between this enzymatic difference and mating type.

850. GROSS, S. R.
Heterokaryosis between opposite mating types of *Neurospora crassa*.
 Biol. Bull. 1950 : 99 : 331-32. (Abst.).

Evidence of heterokaryosis between opposite mating types has been obtained, using the following stocks: lysineless albino a, pantothenicless albino a, pantothenicless pink A and lysineless pink A. Furthermore, it was found that the nuclear ratios for the lysineless and pantothenicless characters greatly varied according to whether heterokaryosis was between similar or opposite mating types; nuclear ratios also depended upon whether the mating type was associated with the pantothenicless or lysineless genotype in matings between opposite types. Attempts to study dominance relationships of autotropic mutants in heterokaryons should therefore be approached carefully since the determination of nuclear ratios may often be of complex nature.

851. EPHRUSSI, B. and
 HOTTINGUER, H.
**Direct demonstration of the mutagenic action of euflavine on
 bakers' yeast.**
 Nature, Lond. 1950 : 166 : p. 956.

Euflavin has been found to exert a mutagenic effect upon bakers' yeast, resulting in cells deficient in some respiratory enzymes and thus unable to oxidize glucose. It was observed that all mother cells subjected to euflavin treatment, after producing several mutant buds, remained normal themselves and also capable of producing some normal buds. It is therefore unlikely that a gene mutation or mutation of any cell constituent is responsible for the abnormal cells produced. The occurrence of such cells is best accounted for by

assuming that an autoreproducing cytoplasmic component, necessary for the synthesis of the respiratory enzymes, was not included in some of the buds. Since a cell can alternately produce mutant and normal buds, this cytoplasmic component must be of a particulate nature.

852. KUMATAKU, T.
(On the artificial production of yeast hybrids).
Seiken Jiho (Biological Report) 1942 : No. 1 : 29-33.

Conjugation was obtained between Oslo x *Saccharomyces Shaoshing*, Oslo x Florylin, 396 x *S. thermantitonum* and race XII x *S. thermantitonum*. Descriptions are given of the first named hybrid and of its back cross progenies.

853. MOSIAŠVILI, G. I.
(The importance of R and S forms of yeasts for wine making).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1950 :
No. 9 : 30-31.

In Georgia, dissociation occurred in the races Kahuri 5, Kahuri 10 and Steinberg 1892 when pure cultures were kept under thermostatic control for over four days. The morphological, physiological and biochemical properties of forms R and S are described. Form R gave a better quality wine than form S or the initial yeast culture.

854. KRASNOKUTSKAJA, S. V.
(A method of making dessert wines without addition of alcohol).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1950 :
No. 9 : 16-20.

Russian experiments directed at improving the fermentation capacity of several races of wine yeasts including that of four races selected from the naturally fermented Aligoté wine from Mšatka, Crimea, are described. One of these, Mšatka 22, is described as a particularly active yeast capable of fermenting wines to a strength of 18% alcohol.

855. KIRJALOVA, E. N.
(Problems of microbiology in making wines from fruits and berries).
Latv. PSR Zinātņu Akad. Vēstis 1950 : No. 1 : 87-92.

The research work with yeasts at the laboratory for wine making of the USSR Institute of Agricultural Microbiology included the study of several new races of *Saccharomyces ellipsoideus*, selected from pome fruits, stone fruits and small bush fruits originating from different parts of Latvia.

856. WINGE, Ö. and
ROBERTS, C.
Identification of the gene for maltose fermentation in *Saccharomyces italicus*.
Nature, Lond. 1950 : 166 : p. 1114.

Three polymeric genes for maltose fermentation, designated M_1 , M_2 and M_3 , have been found in *S. cerevisiae* (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2136); a fourth gene for maltose fermentation, M_4 was obtained by spontaneous mutation. The four genes are inherited independently. The single gene for maltose fermentation present in *S. italicus* (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 813) has proved to be the gene M_1 in spore crossing experiments. Data are given on the segregation ratios for maltose fermenters and

non-fermenters in the hybrids between *S. italicus* and M_2 , M_3 and M_4 types of *S. cerevisiae*. No fundamental differences in the biochemical expression of the four *M* genes has so far been demonstrated.

857. CHEN, S. Y.,
EPHRUSSI, B. and
HOTTINGUER, H.
Nature génétique des mutants à déficience respiratoire de la souche B-II de la levure de boulangerie. (**Genetic nature of mutants deficient in respiratory activity from the strain B-II of bakers' yeast**).
Heredity 1950 : 4 : 337-51.

Two types of mutants lacking cytochrome oxidase and succinic dehydrogenase occur in the yeast strain Boulangerie II, one arising in the course of vegetative reproduction and the other after meiosis. Hybridization studies indicate that the latter type is determined by a single recessive gene. The former type appears to differ from the normal in the loss of a self-reproducing cytoplasmic factor.

858. MUNDKUR, B. D.
Evidence excluding mutations, polysomy, and polyploidy as possible causes of non-Mendelian segregations in *Saccharomyces*.
Ann. Mo. Bot. Gdn. 1949 : 36 : 259-80.

Tetrad analyses carried out on five different crosses of *Saccharomyces* haploids with regard to fermenting ability revealed high frequencies of departures from the usual Mendelian segregation ratios. These irregularities resulted from the use of certain haplophase parent stocks, which, when crossed with standard haplophase clones, produced marked disturbances in the segregation ratios of the progenies. Clones giving these irregularities are termed converters. In heterozygous crosses, the progeny consisted of an excess of fermenter segregants, when converters possessing dominant fermenter phenotypes were mated with recessive standard clones; tetrads frequently comprising an excess of non-fermenters were obtained from crosses of converters, characterized by recessive non-fermenter phenotypes, with standard clones of contrasting phenotype. Segregations of vitamin synthesizing abilities were also irregular; disturbances in mating type reactions were also noted. The anomalies encountered in the segregation ratios for fermenting abilities are explained on the basis of Lindgren's gene conversion theory (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2428). This concept envisages the gene as a loosely organized, labile complex capable of sharing part of its essential components with its allele, thus endowing the allele with new or increased capacities. According to this view, the gene, in parting with some of its essential constituents, is susceptible to partial degradation; the deprivation, if excessive, may result in a weakening or even loss of the original capacities of the gene undergoing loss of constituents; a dominant gene may thus be altered so that its normal function is partly or wholly degraded.

859. SPIEGELMAN, S.,
SUSSMAN, R. R. and
PINSKA, E.
On the cytoplasmic nature of "long-term adaptation" in yeast.
Proc. Nat. Acad. Sci. Wash. 1950 : 36 : 591-606.

The hypothesis put forward by Winge and Roberts (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2136) to explain the ability of the substrate to influence the Mendelian segregation of capacity to form the corresponding adaptive enzyme system is criticized, on the grounds that the possibility that transmissible cytoplasmic elements may be involved in adaptation is not considered.

The present authors have analysed the phenomenon of long term adaptation to galactose in yeast. Variance analysis and the demonstration that reversion to the original type is a

mass phenomenon have eliminated the possibility that the phenomenon is based on genic mutation and selection. The data indicate that contact with the substrate induces, in a small proportion of cells, a modification leading to the ability to form enzyme rapidly. This modification is transmitted from one cell generation to the next by cytoplasmic elements which increase autocatalytically. These conclusions are in agreement with those deduced from previous studies of enzymatic adaptation in fast adapting strains. It is emphasized that the nature of the discrete cytoplasmic components determining enzyme synthesis and the degree of autonomy to be ascribed to them, by virtue of their behaviour and autocatalytic growth, constitute the crux of the problem of long term adaptation.

860. LEUPOLD, U.

Die Vererbung von Homothallie und Heterothallie bei *Schizosaccharomyces Pombe*. (**The inheritance of homothally and heterothally in *S. Pombe***).

C.R. Lab. Carlsberg 1950 : 24 : Sér. Physiol. 381-480.

The initial strain of *S. Pombe* from Holland proved to be a mixture of two homothallic races differing in fertility and classified as the 40% type and the 90% type according to the number of spores, two conjugating types of a heterothallic race and a sterile race. The problem of prereduction and postreduction is fully discussed in the light of previous work. The writer explains the conditions under which regular serial arrangement of the spores in *S. Pombe* allows of deductions concerning the frequency of prereduction and postreduction of a pair of allelomorphic genes.

The following crosses were made: heterothallic + x heterothallic -; homothallic 90% x heterothallic +; homothallic 90% x heterothallic -; homothallic 40% x heterothallic +; homothallic 40% x heterothallic - and homothallic 90% x homothallic 40% which was a failure. Experiments were also made to investigate the mutations of the homothallic and heterothallic types.

Having discussed his results and those of other workers from the genetic standpoint, the author finally concludes that there is a series of three allelomorphic factors, one of which is responsible for homothally, whilst the other two control the determination of sex in the heterothallic condition. This conclusion forms the basis of the writer's interpretation of his results relating to the homothallic 90% type and the two heterothallic conjugating types. Thus, the following results, (a) 2 : 2 segregations in the crosses of the three types, (b) the agreement between the reduction values and (c) a mutability of the underlying factors, which obviously permits of each of the six theoretically possible mutation stages between the three genes, are all findings in satisfactory agreement with a theory of multiple allelomorphism of the three factors. The homothallic 40% type, however, shows some deviations in behaviour which make it questionable whether an allelomorphic relation exists between the underlying factor and the three remaining genes.

861. SUBRAMANIAM, M. K. and

KRISHNA MURTHY, S. N.

Effect of acenaphthene on yeast strains of different genic and chromosomal constitutions.

Proc. Indian Acad. Sci. 1949 : 30 : Sect. B : 185-94.

Different brewing yeast strains were treated with acenaphthene, in order to explain the divergent results obtained by various workers investigating the effects of agents causing polyploidy.

After ninety days' treatment, Smooth I type produced two distinct types of cell, a top yeast and a tetraploid. With the same treatment lasting forty five days the same strain produced tetraploids only. Since mutations at the locus determining the nature of sculpturing of the colony have been demonstrated it was concluded that mutations at other loci were possible, and had occurred, as the production of top yeasts on treatment with acenaphthene appear to be conditioned by genetic constitution. The forty five day's

treatment also produced tetraploid colonies in the Strain Rough I. A top yeast and an octoploid colony were obtained from a tetraploid strain similarly treated. Spontaneous tetraploid sectors occurred occasionally in both Rough I and Smooth I colonies.

These indications of polyploidy in strains of brewing yeast are used to contest the validity of the cytogene and plasmagene concepts of Lindegren and Spiegelman (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1458).

862. PICHLER, F.

Über Roggensteinbrand (*Tilletia tritici* f. sp. *secalis*). [On bunt (*Tilletia tritici* f. sp. *secalis*) in rye].

PflSch. Ber., Wien 1950 : 5 : 273-86.

Investigation of bunt in rye led to the following provisional conclusions. Bunt occurs sporadically in rye in the alpine parts of Austria and its occurrence is dependent on the weather. Spores of rye bunt owing to the development of higher reticulations are larger than spores of wheat bunt. Under certain conditions, wheat bunt may attack rye only to a slight degree and when rye is the host plant the wheat bunt spores are altered as regards their morphology, physiology of germination and parasitic nature; these changes can not be attributed to selection by the host plant. Rye bunt is not a particular species of *Tilletia*, but is instead only a specialized form of wheat bunt and is therefore more correctly described as *Tilletia Tritici* f. sp. *Secalis*. Rye bunt and dwarf bunt have many similar characteristics.

CROP PLANTS

863.

An international index of films on the conservation and utilization of resources. United Nations Scientific Conference on the Conservation and Utilization of Resources 1949 : Pp. 175. (Mimeographed).

A number of films on land resources include the following: Academician Tsitsin (USSR), which deals with Tsitsin's [Cicin] research in grain culture; Blue lupine (USA); Certified for seed (Canada), showing various cross breeding experiments with potatoes; The Dutch seed potato (Netherlands); Fertility (France), showing the development of a new strain of wheat; A film on fruit (Netherlands), which includes the scientific research involved in fruit production; Mičurin (USSR), which deals with his experiments on new strains of grain and fruit; Promises (Canada), which includes research in the economic possibilities of native plants; Science and Agriculture (USA), tracing the history of the soya bean; Seed (UK), dealing with seed trials; Seeds and Science (UK), an account of plant breeding research carried out by various workers with cereals; Sugarcane (USA), showing the development of disease resistant varieties in Louisiana; Turn the Soil (Australia), which covers the development of scientific wheat breeding; Welsh Plant Breeding Station (UK), giving a general account of the methods of cross breeding, establishing new strains and their multiplication at the Aberystwyth station; and Wizards of Svalöf (Sweden), which deals with the genetics of wheat and the breeding methods of plant improvement by selection, crossing and exposure to X-rays and chemical treatments for inducing polyploidy.

864.

Teamwork in world agriculture.

Agric. Inform. Bull. U.S. Dep. Agric. 1950 : No. 21 : Pp. 21.

An account is given of schemes of technical cooperation, including projects on plant improvement, undertaken by the United States Department of Agriculture in collaboration with Latin American and other countries.

865.

Report (abridged) by the Directors and Report by the Director of Research to the Annual General Meeting 27th July 1950 of the Scottish Society for Research in Plant-Breeding 1950 : Pp. 55.

Oats

By selecting hybrid material with short stout straw and a strong root system, progress has been made in obtaining increased resistance to lodging. The first variety produced at the Corstorphine Station to show improvement in straw quality was rather too late in ripening to suit the requirements of most growers in Scotland. Attempts made to combine the high degree of resistance to lodging possessed by this variety with earlier maturity have resulted in the new variety *Craigs Afterlea*. The variety may be released commercially in 1951. It is however possible that an early ripening variety may not give such a high yield of grain as later ripening oats. It is also pointed out that short strawed cereals in general require a high level of fertility to produce a grain yield comparable with that of the best longer strawed types.

An attempt is being made to produce earlier ripening types with improved grain yield, suitable for the northern areas and upland soils of Scotland, using *Bell* as one parent.

It is hoped to reduce losses due to sprouting in the stook by breeding varieties resistant to prompt germination. Selections derived from crosses with *Avena fatua* showing dormancy in the greenhouse are to be included in field trials.

A higher yielding type is required for the alkaline soils in various parts of the west and north of Scotland. A selection from a cross between *A. byzantina*, reported to be lime tolerant, and an old Scottish variety, has given promising results in the island of Tiree and is to be tested more extensively. Its grain is larger and more attractive in appearance than that of *Bristle-pointed* or *Myrtle*.

A number of crosses were made with the variety *Rothenburger*, a black oat reported to be tolerant of mineral deficiency in Australia.

Many hybrid selections developed at Corstorphine are under trial at the Agricultural Colleges and National Institute of Agricultural Botany.

The results of a replicated trial of 45 unnamed hybrids in comparison with the standards *Onward*, *Yielder*, *Star* and *Sun II* are summarized.

Tetraploids of *A. strigosa* have been obtained by colchicine treatment; seed of these has been sown to build up a stock for using in the hybridization programme in an attempt to synthesize a hexaploid *A. strigosa*.

A satisfactory technique for testing for the presence of leaf spot disease (*Helminthosporium Avenae*) on oat seed has been devised. Inoculation techniques are to be studied with a view to testing and breeding varieties for resistance to this disease.

Barley

Breeding and selection of promptly germinating barleys continued. The characteristics of naked barley are being investigated as this type may be useful for the production of pearl and for feeding pigs and poultry. The naked type is inferior in yield and straw strength to the commonly grown husked varieties but possibly these defects could be overcome by hybridization and selection.

Herbage plants

Certain trends in behaviour have emerged as a result of the study of the perennial rye grass collection made in the southwest of England in 1947, in an attempt to find a type characterized by early spring growth. Marked differences between average dates of first ear emergence were found both between and within populations. In general a significant correlation exists between date of ear emergence and age of pasture, i.e. the older the pasture the later the time of ear emergence; possible reasons for this are discussed. It was always noted that date of ear emergence and amount of early spring growth are significantly correlated when populations within a district are considered; this correlation does not however hold if all populations from the area of collections are analysed, since populations from the Scilly Isles are very late to show flowering stems yet begin growth quite as early as some mainland populations which have a much earlier date of ear emergence. Attempts are being made to establish a bred strain predominantly of the type occurring in local

communities in the Scilly Isles, with exceptionally large size and high yielding ability in early spring. Cocksfoot is also receiving attention, emphasis being laid upon special purpose types and types capable of early spring growth and responsive to liberal manurial treatment.

At the Dalmahoy Centre, work has been carried out on the determination of the varietal composition of swards best able to produce protein-rich complementary grazing from mid-April until the end of May and again during September and October, as well as silage or hay crops during the summer months. The practical applicability of the results obtained at Dalmahoy is tested at the Dundonnell Centre. When the highest possible yields are required at a particular time of year, it would appear that swards of specialized maturity composition should be used.

A more complete knowledge of strains of indigenous species is required in tackling the general problem of increasing the value of natural grasslands in moorland areas. Study of sheep's fescue in this connexion has revealed the presence of two chromosome races which appear to be indistinguishable morphologically in the field but differ in geographical distribution throughout the British Isles.

Populations of meadow grasses, comprising both species and hybrids, have been planted out in a trial which is part of the inter-Continental plan initiated by J. Clausen.

Swedes

Yield trials were carried out on early and late strains from recent crosses. The strains were also analysed for dry matter content. In the trial of late strains, CHO, a pedigree line selected from Champion, gave the highest dry matter yield; six lines from the cross ANM between Excelsior and Stirling Castle were all above the average in dry matter content; the best of these, line ANMaE, was second for dry matter yield per root and had an average dry matter percentage and heavy root weight. Line ANWeA, from the cross ANW between Excelsior and a Danish club root resistant strain, was placed third for dry matter yield, with relatively high dry matter percentage and root weight.

Strains were evaluated for resistance to club root in field plots and seedling tests.

Several strains undergoing trial and others which could not be tested were grown in observation and selection plots. These included strains being bred to combine purplish plant pigmentation with the good qualities of the yellow fleshed swede, hybrids between swede and rape kale in which bulb formation is combined with curled leaves, and strains of swede and turnip ancestry.

Kale

Thousand-headed kale strains have a rather low proportion of leaf to stem but appear to maintain their feeding value during the winter. A strain, designated AMK, was selected from a cross between thousand-headed kale and broccoli; this has a considerably higher ratio of leaf to stem in the autumn but during the winter the amount of leafage is much reduced. In the first and second hybrid generations the plants were very large and appeared to be good fodder types but the next two generations have shown a drop in vigour, although the autumn leafage is still comparable with that of thousand-headed kale. Two other hybrid strains are under investigation: AMT from a cross between perpetual and curly kale; and AOC from a cross between AMT and thousand-headed kale. It is hoped to obtain strongly curled types capable of vegetative propagation like perpetual kale but so far an ideal type has not been found.

Broccoli

Strain 9 : 3 derived from Royal Oak has been selected, mainly for winter hardiness. Three of the progenies of crossings between plants of this strain which survived the hard spring of 1947 have shown the low, compact leaf habit desired in this strain; their seed has been harvested separately for further tests.

Potato

Studies of strains of *Phytophthora infestans* from various sources continued. Varieties and seedlings with field immunity from viruses A, X and Y and resistance to leaf roll have been crossed with late blight resistant plants in order to secure a combination of resistance to

blight and virus diseases. Many of the blight resistant seedlings which have successfully passed initial trials have proved to be field immune from virus X; others have exhibited field immunity from virus Y. Tests for resistance to the leaf roll virus and also to scab are limited to observations following exposure to natural infection in the field; wide differences in the behaviour of selections have been apparent, suggesting that those remaining free from symptoms of the diseases are inherently resistant. The search for resistance to blackleg within the genus *Solanum* continued but has so far been unsuccessful.

Preliminary investigations into the possibility of breeding for frost resistance are being made.

In the Lord Derby Gold Medal Trials of 1949, Craigs Royal (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1693) compared favourably with the control varieties and was awarded the Lord Derby Gold Medal Certificate.

Information is given on the successful performance of some of the Society's varieties in Africa.

Work continued on the following: (1) improvements and methods of testing material for virus resistance; (2) classification and evaluation of virus resistance in varieties and seedlings; (3) genetics of virus resistance; (4) synthesis of virus resistant material for use in future breeding of commercial varieties; (5) the problem of virus strains; and (6) development of serological methods appropriate to the work in progress.

Data on the reactions of hybrid seedlings derived from *S. brevimucronatum*, *S. jujuyense*, *S. saltense*, *S. simplicifolium* and *S. Rybinii* showed that linkage exists between the genes conditioning response to infection with viruses A and X and between the genes responsible for reaction to infection with viruses, A, C and Y. In the case of the linkage *Nx-Na* the cross over value was similar to that already found in commercial tetraploid material, thus indicating similarity, if not identity, of the genes concerned. A study of the gene complex *Na-Nc-Nz* in hexaploid material has now begun.

The resistance to virus Y found in *S. Rybinii* CPC 979 shows quantitative inheritance. Certain of the hybrids between CPC 979 and plants killed by virus Y were extremely difficult to infect; their reactions when infected indicated that the combination of resistance and lethal response through hybridization offers a most promising source of field immunity from virus Y.

Earlier work on virus reactions in *S. simplicifolium* was obscured by genetic abnormalities in the species; these abnormalities have now been traced to partial female sterility of genetic origin.

Sugar beet

Consideration is being given at present chiefly to (1) a search for non-bolting and vigorous strains of sugar beet for early sowing, and (2) an enquiry into the possible use of heavy cropping forms of beet for sugar production on farms where the soil is rather shallow and of medium fertility. Non-bolting strains from the Cambridge Plant Breeding Institute and elsewhere were compared with sugar beet types most commonly grown in Scotland. The results again showed that the Cambridge method of selecting non-bolting families from among plants treated with artificial light is most effective, and furthermore, no signs of deterioration in sugar yield were found in the non-bolting material. Non-bolting material was further selected. A small trial was also carried out to test the bolting behaviour of Klein AA and Klein E. Five varieties of fodder sugar beet were compared with three of true sugar beet and two mangold varieties. No support was gained for the view that fodder beet would outyield a good sugar beet variety on land similar to that of the station, i.e. deep medium loam at 200 ft.

Beans

New lines are being selected for bean size and shape and several other characters. A number of promising true breeding lines are to be further tested in field trials. It has been found that up to 9% of the seed obtained from a single row of 20 bean plants growing among wheat became contaminated by cross pollination at distances ranging from 200 to 300 yards from a field crop of beans; this method of spatial isolation for small numbers of plants has been discontinued. Selection is being carried out on natural hybrids obtained from open-pollinated plants of the reference collection of named varieties.

866.

Plant breeding in Great Britain.

Nature, Lond. 1950 : 166 : 856-58.

An account is given of the fourth annual conference of British Plant Breeders held in August 1950 at the Scottish Plant Breeding Station, Corstorphine, Edinburgh. The activities of the Scottish Society for Research in Plant Breeding are outlined, comprising breeding work on cereals, herbage plants, potato, swede and sugar beet and investigations on potato virus diseases. Most of the work referred to has been described in the annual report of the Society (cf. Abst. 865).

867. PFEIFFER, R.

Bericht über die Tätigkeit der Bundesanstalt für alpine Landwirtschaft in Admont im Jahre 1948. E. Das Referat für Getreidebau. (**Report on the work of the Federal Institute for Alpine Agriculture in Admont in the year 1948. E. The report on cereal cultivation**).

Veröff. Bundesanst. alp. Landw. Admont 1950 : No. 3 : 19-40.

Varieties of winter and spring barley, winter and spring wheat, winter rye, oats, maize and soya bean, included in the Austrian breeding register, were tested as regards yield, 1000 corn weight, hectolitre weight, date of shooting and resistance to lodging and diseases. By using a new statistical method of estimating winter killing from an analysis of a complete stand, exact results were obtained for six winter barleys. A table shows the anthocyanin coloration of the coleoptiles as a varietal characteristic for different varieties of spring wheats and in a few cases for other species of *Triticum*.

The main general aims of the breeding research are to evolve cereals resistant to black stem rust, lodging and winter killing.

Wheat

Hybridization and subsequent selection have so far given the black stem rust resistant varieties Dr Lasser's Dickkopf [Dr Lasser's Square Head] and Admonter Frühweizen [Admont Early wheat]; the latter variety also resists lodging.

The high yielding phenotypically pure strain 97, a winter wheat of the type of Dr Lasser's Dickkopf is now resistant to black rust and lodging. A cross of the Canadian variety Thatcher with the German variety General von Stocken was found to be a hardy, high yielding strain, resistant to black stem rust and lodging. Some strains with Thatcher as a parent were early ripening and completely resistant to black stem rust.

Selections from crosses are being made to obtain a high yielding spring wheat resistant to lodging and as far as possible to black stem rust.

Oats

The main breeding aim is a variety resistant to black stem rust and lodging. Preliminary hybridization to obtain resistant initial varieties has been carried out.

Winter rye

Three hybrid strains were tested for resistance to black stem rust, lodging and winter killing. The cross Schlägler x Lungau Tauern rye is promising.

Barley

The aim in breeding is a high yielding, fodder barley resistant to lodging and low temperatures and having a high protein content. Five crosses made in 1941 between the three Rumanian black barleys Albert, Drouady and Pollux and the German varieties Mahndorf 65/29, bred by Lasser, and the mid early Peragis, gave barleys with much higher yields than those of native Austrian varieties.

For spring barley, the breeding aims are high yielding varieties, resistant to lodging.

868. ŠEFTELJ, I. M.

(**Nikita Garden is the green treasure-house of the USSR**).

Priroda (Nature) 1950 : No. 8 : 90-95.

The activities at the Nikita Botanical Garden, founded in 1812, are briefly surveyed, with notes on introductions of and selection work with economic plants. Mičurinite study of the

plant collections and hybridization have given promising new varieties of southern fruits, subtropical fruits and essential oil plants, including apricots and plums noted for their good flavour, large fruited high quality peaches suitable for table use and processing, productive and hardy almonds, figs with a high sugar content suitable for drying, regularly bearing olives with high oil content, and essential oil plants with high extraction rates.

869.

Hybridization has meant increased crops.

Soviet News 1950 : No. 2451 : p. 4.

Some information is given on the practical results accruing from recent work at the Lysenko Institute of Breeding and Genetics. It is stated that with hybrids produced by crossing different varieties of winter wheat an increase in yield of between 90 and 270 lb. per acre is obtained, compared with that of selected non-hybrid seed. Hybrids of rye are said to provide a yield increase of 180 to 270 lb. per acre. Improved yields have also been secured by hybridization of barley, maize and sunflower. Hybridization has also resulted in increased oil content in sunflower seeds; the improved yield and oil content are maintained for 9 to 10 generations. Among the new varieties of grain crops released to collective farms are a branched wheat acclimatized to the steppes of southern Ukraine and a winter barley able to withstand 25 to 27° C. of frost. New rapidly ripening cottons have been developed for unirrigated conditions. The institute is planning to produce special varieties of crops for the newly irrigated areas which will cover 3,750,000 acres after the completion of the South Ukrainian and North Crimean Canals.

870.

SAGALOVICH, E. N. and

GESKINA, E. JA.

(For a better production of élite seed of vegetables and cucurbits).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 8 : 21-24.

Breeding and seed growing work at various Soviet breeding institutes is briefly surveyed. The best breeding results were obtained at the following institutes. The Gribovo station has produced the tomato Gruntovyĭ Gribovskii [Outdoor Gribovo], the carrot Moskovskaja Zimnjaja [Winter Moscow], the beets Nesravnennaja [Incomparable] and Podzimnjaja [Late Autumn] and the melon Gribovskaja [Gribovo].

At the Puškin branch station of the USSR Institute of Plant Industry, new early tomatoes, Puškinskii [Puškin] and Urožainyi [Productive], were developed. These varieties yield fully mature red fruits under Leningrad conditions.

At the Birjučii Kut Station, new standard varieties of cucurbits were obtained.

The results obtained at the White Russian Fruit and Vegetable Research Station include a new cabbage variety, Jubileinaja [Jubilee] and a tomato variety Minskii [Minsk].

The Har'kov Vegetable Breeding Station and the Skvir Field Research Station have developed new early water melons which show great promise in the northern limits of cucurbit cultivation.

871.

*Årsberättelse över Sveriges utsädesförenings verksamhet år 1949.

(Annual Report of the Swedish Seed Association for the year 1949).

Sverig. Utsädesfören. Tidskr. 1950 : 60 : 295-67.

Among the new varieties produced by the Swedish Seed Association during 1949 were the following: 01420b₂, a new winter hardy autumn wheat élite from Robur, with relatively short straw; 01519, 2-rowed barley from Maja x Sv 34/22, with very high grain yield; 034 a high yielding, tetraploid red clover from Merkur x Wambåsa; the autumn rape 04 (Sv 45/70) derived from Wilnensis and much harder than Lembke's and Matador and

* An extended summary of this paper is on file at the Bureau.

superior to Svalöfs Senraps [Svalöf Late rape] in seed yield; the spring turnip rape 0301 M, bred from a combination of several different strains; the linseed 01052, a selection from a Bolltorp strain and equal in seed production to Valuta; and 0700, a new variety of *Camelina* derived from Rumanian material from the Botanic Garden at Timisioara.

The work of the Svalöf Institute is recorded below; details are also given in the report on the work of the branch stations.

Spring Wheat

The intensive breeding programme was continued along the same lines as in previous years, special attention being devoted to autumn x spring crosses as a means of raising the yield. The successful spring wheat Ella (cf. Abst. 139) was obtained in this way.

Oats

White oat breeding was continued to obtain varieties for southern Sweden superior in yield, strength of straw and quality to the varieties grown at present. Crosses with Örn [Eagle] to combine high yield, earliness and large grain are promising, and Blenda, put on the market in 1950 (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 8), is one of the successes produced from this material. The breeding programme also includes: (1) a series of hybrids between the Probsteier types Sol II, Seger [Victory], Stjärn [Star] and Guldregn II [Golden Rain II] on the one hand, and specially early oats on the other, to obtain early types suited to inner and higher lying districts of southern and central Sweden; (2) crosses with the foreign wheats, Mansholt's Binder, Flämingsgold and Sølv II [Silver II]; and (3) crosses with lines from white grained land oats.

Spring rye

Breeding was continued at Ugerup and attention was concentrated on a cross between Petkus and a land variety from Od.

Autumn rye

Work at Svalöf and Ugerup followed the same lines as previously, but progeny testing was introduced as a new method of improvement.

Barley

Work with two-rowed barleys included further tests of Ymer élites and related lines and also newer material of malting and of fodder barley types.

The small scale experiments included many new hybrid combinations in some of which interesting X-ray mutants were used as parents.

The six-rowed barley Presto (Sv 01771) yielded 4280 kg. per ha. as compared with 4090 from Brio. The naked barley Sv 01793 again ranked first in protein content.

Maize

Experiments at Brandeborg and at Högestad were carried out on the value of different varieties for silage.

Herbage plants

The clover Merkur did very well in spite of the prevalence of eelworm and *Sclerotinia Trifoliorum* and surpassed all local strains and commercial varieties, but Sv 038 showed a 10% higher yield and the tetraploids, Sv 034 and a new line undergoing its first trial, surpassed Merkur by 20% and 35% respectively.

In the second year leys of tetraploid Alsike clover four strains yielded 75, 115, 93 and 67% more than Svea, which gave 2.2 tons of hay.

Hybridization of red clover was continued.

Valuable inbred lines of timothy were planted out in a polycross experiment.

Lupin

Mutants for earliness were for the first time identified with certainty in X-irradiated material. Selection among the older and the more recent hybrids has produced some interesting new lines.

Root crops

Experiments on club root resistance of turnips and bolting in beets were carried out. Some beet strains showed a low incidence of bolting.

Potato

Quality tests and a special comparative trial on manganese-deficient soil were carried out. The production of virus free strains was continued and a scheme for raising *Phytophthora* resistant varieties was started.

Textile plants and linseed

The fibre flax Cascade (USA) again gave a remarkable yield of straw. The new varieties Margareta and Kristina (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 139) surpassed the control Herkules by 12% and nearly 15% respectively, though inferior to Herkules in seed production. Out of 33 new lines in the large scale comparative trials, 23 surpassed Herkules in straw yield by 10%, but again the control was superior in seed yield.

The highest yielding linseed, Valuta, exceeded the control by 15% and the new selection of Renodlat [Pure Bred] surpassed its parent form by 12%. Among the foreign varieties, Trifolium (Denmark), gave 14% more seed than Renodlat, whereas Vaanila (Finland), Adoptiv, Rocket (Canada), Øtofte 59/41, Klein 18 and Redson (USA) yielded somewhat less seed.

The monocious hemp seed obtained in 1949 from von Sengbusch outyielded all other varieties with 7830 kg. of stems per ha.; the seed yield was 540 kg. per ha. This hemp showed a fine uniform stand with practically no male plants.

Poppy

Mahndorf yielded 1860 kg. per ha., and the best line from the cross Mahndorf x Peragis 2095 kg. per ha.

Oil crops

Work was on the same scale and on the same lines as in 1948. Svalöfs Senraps 13 [Svalöf Late Rape 13], the autumn rape Matador and the winter turnip rape Rapido yielded respectively 3980, 4820 and 2320 kg. per ha., the highest yields ever obtained in rape trials at Svalöf.

Tobacco

Yield trials included many lines from crosses between Swedish and American varieties. A number of new crosses, including back crosses of the most promising new lines to the parents, also underwent selection.

Hops

A good report was received from the Stockholm Breweries' Co. on the alkaloid content of the hybrid clones planted at Näsrum in 1946, 1947 and 1948. Some of the best of them also proved satisfactory in ripening time, being earlier than Sv 85. In addition, their cones had relatively few bracts and were easily plucked. The plantations of Sv 85 at Näsrum gave a high yield of good quality again in 1949.

Soya bean

Methods and aims were the same as in 1949. At Teckomatorpsgård the control Soja Wilnensis was ripe by 19 September and yielded 945 kg. per ha., while Ugra ripened nine days earlier and yielded 1215 kg. per ha.

Legumes

Of the commercial garden pea varieties the new Torsdags III [Thursday III] (03023) gave the highest yield.

The most productive fodder peas were Parvus, Brio and Sv 05801 (Hero x Artturi).

The small seeded variety Getinge yielded best in the bean group.

The brown bean control Weibull's Stella was surpassed by from 5 to over 20% by four lines derived from the Ahleborg strain.

Cytogenetic research

Polyploidization of red and Alsike clover was continued. Selections of the best timothy plants with 28, 42, 56, 70 or 84 chromosomes were raised in five isolation plots and the various progenies will be tested to see how far practical progress is possible within the various polyploid classes.

Tetraploid turnips, grown at Svalöf and different branch stations, have shown various features of practical interest, e.g. high yield. Work is in progress with tetraploid sugar

beets and field trials with polyploid white mustard and turnip rape were carried out in collaboration with the Oil Crop Division.

The following theoretical problems were studied: the relation between colchicine and plant hormones and their effect on the chromosomes; chromosome reactions due to mercury compounds in fungicides; and the oxyquinoline method for analysing the fine structure of the chromosomes.

Studies on the artificial induction of heritable changes to increase the number of forms of various crop plants are proceeding with special emphasis on the experimental control and direction of the mutation process.

Mutants in the barleys Maja, Gull [Yellow] and the Ymer series have surpassed their mother lines in yield and in other features, e.g. strength of straw and earliness.

Mutation studies of lupins, soya beans, mustard and some grasses are also in progress.

The recently released white mustard, Primex, which surpasses the initial material by 6% in yield of oil was isolated from a progeny following X-irradiation. It also exhibits mutations affecting flower colour and shape of pod as well as the increased yield of seed and oil.

Institute for Research on Inheritance

Work on rye-wheat included selection from older crosses and the multiplication of hybrid populations and new varieties. New types were produced by crossing wheat and selected inbred ryes.

Samples of tetraploid Stål [Steel] rye are being tested for milling and baking qualities.

Work on some old and new hybrids of polyploid barley is proceeding and improved types have been obtained by crossing and selection.

A synthetic rape, obtained by crossing tetraploid turnip rape and tetraploid cabbage, is remarkable for its vigour and fertility and crosses readily with ordinary rape.

The work of the branch stations is reviewed in detail.

872.

Weibullsholm 80 år. Några glimtar av dagens gärning och dess resultat.
(Weibullsholm, 80th anniversary. Some glimpses of the day's happenings and their results).

Lantmannen 1950 : 34 : p. 592.

In recording the commemoration of the foundation of the Weibullsholm Plant Breeding Institute mention is made of the following varieties which will soon be put on the Swedish market: Eroica II, a new wheat surpassing Eroica I in hardiness, Storrybs [Large turnip rape], a hardy, high yielding type, Pondus spring wheat (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 197) derived from a cross of a sister variety of Atle and a Russian or Canadian wheat, and high yielding according to the official trials, and the Rika barley which is more productive and stiffer strawed than its sister variety Herta (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1791).

873.

D.L.F.s Generalforsamling 1950. (General meeting of the DLF* 1950).

Tidsskr. Frøavl 1950 : 20 : 53-63.

Breeding work at various experimental farms connected with the DLF in Denmark followed the usual lines (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 652). Seed production of crop plants was carried on with the aid of grants from various sources.

Root crops

Strains of swedes submitted for certification by the government research stations were awarded the second, third and fourth places among strains tested.

* Danske Landboforeningers Frøforsyning [Danish Farmers' Associations for Seed Production].

The three swedes Bangholm Wilby Øtofte X, Bangholm Øtofte X and Wilhelmsburg Øtofte X and E were accepted for certification, the designation E indicating high resistance to club root on severely infected soil.

Vegetables

Strains of celery and leeks bred at Toftø were also certified on the basis of their performance in official trials.

874.

Problems of agricultural development in Japan.

Wkly. Summ. Natural Resources Sect. Gen. Hdqrs Allied Powers,
Japan 1950 : No. 243 : 14-23. (Mimeographed).

Recommendations concerning plant breeding work which should be undertaken in Japan are put forward. Methods designed to develop new varieties as rapidly as possible and to utilize exotic material are stressed as important, such as back-crossing and increase of numbers of hybrids from given parents.

875.

WOODFORD, R. C.

Annual Report of the Department of Agriculture, Assam, for the year ending 31st March 1948 : Pp. 352.

Varietal trials are reported for wheat, maize, barley, potato, flax, linseed, *Amaranthus* sp., and mustard and pure line selection is being carried on with *Lathyrus sativus*, cotton, jute, tobacco, chilli, groundnut and *Hibiscus esculentus*. The following additional information is of interest to plant breeders:—

Rice

At the Karimganj farm the study of inheritance of the purple leaf blade colour in the cross between Lati winter rice and a full purple type was continued in the F_3 generation. Two other summer rice crosses were studied in the F_1 and F_2 generations.

Sugar cane

Improved varieties are being obtained at the Jorhat farm. Some varieties introduced from Coimbatore have produced juice of superior quality.

Citrus

Indigenous citrus fruits have been classified as a result of extensive taxonomic research. Observations on the reactions of introduced varieties were recorded at the Citrus Fruit Research Station at Burnihat.

Legumes

Varietal trials of pulses were carried out at the Jorhat farm. Improvement of *Cajanus indicus*, *Phaseolus Mungo* var. *Roxburghii* and *Ph. radiatus* is receiving attention. Several high yielding line selections of *Cajanus indicus* have been made.

Pure line selection of soya bean is in progress at Jorhat, with experiments of the effects of the time of planting in different varieties.

876.

Annual Report of the Department of Agriculture in the Province of Bombay, 1946-47 (1950) : Pp. 45.

Wheat

Niphad-4 withstood a black rust attack remarkably well and is to be distributed in Gujarat. Yield trials of varieties and hybrids were carried out. The genetic improvement of Baxi and Khapli has been undertaken at Padegaon and selections have been made in the bulk samples grown during the year. Rust resistant wheats have been selected, including hybrids from crosses of Kenya El44 and Thatcher with Niphad-4. Segregates from crosses between Niphad-4 and rust resistant East African wheats showed considerable promise in respect of rust resistance and other agronomic characters.

Work on the genetic improvement of hard red wheats of the Karnatak, which are especially suitable for macaroni, is being done at Bijapur. Promising selections have been made but all were attacked by rust. Varietal tests are reported. Selections of Dhola-katha and Rata-katha were grown in row trials.

Maize

Mass selection of Sumeri maize was continued, and various inbreds were maintained. New samples of maize were collected from all over the province for growing at Arbhavi. Some crosses between inbreds proved superior to the local maize in both yield and grain size. Promising double hybrids have also been obtained. Experiments are being conducted to find a cheap and practical method of producing hybrid seed.

Bajri (*Pennisetum typhoides*)

The three improved cultures, AF-3, 28-15 and LM38/39, maintained their superiority over local and Akola bajri in district trials conducted by the Cereal Breeding Station, Niphad, 28-15 being particularly promising. Crosses between group bred cultures have shown a high degree of heterosis, giving yields up to 20% more than the local bajri. Mass selection of improved local varieties was continued. Experiments are in progress to determine a cheap method of producing hybrid seed.

Small millets

Work on the genetic improvement of nagli, vari and kodra is in progress and a number of promising selections are under trial.

Jowar

Nandyal, Gidgap, Elichpuri and Budh Perio-53 have proved suitable for general cultivation in the Deccan Canals area and further selection of these varieties is in progress. Two out of five selections of Dagdi rabi jowar have been found promising. Selections of other rabi varieties are being tested.

Yield trials of fodder varieties and new rabi selections are reported. M-35-1 has been crossed with various Punjab varieties to improve its fodder quality and yield and introduce earliness. At Bijapur, selections of Gund and Maldandi and hybrids between these varieties and improved Maldandi strains were tested. M-35-1 has proved superior to other varieties on limy and ordinary soils. Selections of local Gidgap were tested at Nipani. Work is also in progress on the breeding of jowar strains resistant to *Striga* attack. Promising segregates have been obtained from crosses made in this connexion between exotic and improved local varieties.

Rice

Breeding work with non-scented, scented and salt-land rice for Deccan and north Konkan is conducted at Karjat, at Vadgaon and Igatpuri and at the recently established Panwel farm respectively. Two new strains of Zinya superior to Z-149 have been selected. Mahadi 8-2, strain 159 of Ambemohor and selections of Chimansal did well in trials. The genetic improvement of Sal, Tansal, Raybhog and Varangal has been undertaken. At Igatpuri, crosses between non-scented varieties and varieties with such characters as scent and fineness have been effected. Promising selections of salt land varieties have been made at Panwel.

At Kumta selection is in progress in the varieties Bile-Akka, Sannapandya, Doddapandya and Sanna-Malliga. Several crosses have been made to raise the quality of improved strains. New selections of early, mid-late and late Mugad and Antarsal strains were made at Mugad, and selection work with Dodgya and Yelikirisal strains is also in progress in order to develop strains superior to Dodgya-622 and Yelikiri-4. Breeding work has been undertaken with a view to introducing colour into the improved Mugad and Antarsal strains to facilitate roguing and combining scent, fineness and high yield.

At Bulsar, selections of Kada, Wankwal, Kolan, Dudani and Lashkari were tested. Improved strains from Karjat did not show superiority over the local variety, Kada. Selections of Jirasal, Kamod, Pankhali, Sutarsal and Sukhwel were tested at Nawagam. Some improved strains from other places compared favourably with local varieties, but the results need confirmation.

Lathyrus sativus

Trials in the Broach district have shown that Indore T-2-1 and Indore T-2-12 outyield local types of lang by 24% and 40% respectively and are 100% wilt resistant in the field.

Cotton

The objective of the breeding work at Surat is to develop a type of cotton suitable for cultivation in south Gujarat and having as high fibre qualities as 1027ALF and a higher ginning percentage. Suyog, a segregate from the cross between 1027ALF and 1-ALB has proved acceptable to the cultivators because of its high ginning percentage. Two promising synthetic strains, 1-4 and 77-2-2-3, have been developed and are under test in cultivators' fields; both are superior to Suyog, and 77-2-2-3 is 10 days earlier than the latter. Research work at Shera has led to the production of two strains for south Gujarat, 2266 and 3652, which have the desirable agricultural characters of 1027ALF and Suyog as well as wilt resistance.

At Broach a strain called Vijay has been developed which is superior to BD8; its staple is being improved by further hybridization with 1027ALF.

The synthetic strain K-72-2, now named Kalyan, developed at Viramgam, exceeds Wagotar and Wagad Local in yield of seed cotton; its fibre length is 0.85 as compared with 0.79 inches in Wagotar and Wagad Local and it spins 27.5 as compared with 20.5 and 15.5 in these two varieties respectively. The ideal cotton for north Gujarat should have early maturity, good fibre quality and high ginning outturn. Early strains which escape frost damage have proved poor yielders, however, and further work on the improvement of Kalyan should be directed towards the production of a frost resistant strain.

The cotton breeding scheme at Anand has been terminated. Fourteen promising selections of Rozi cotton are being maintained at Broach.

The possibilities of improving cotton by hybridization between American and Asiatic cottons are being explored at Surat where fertile hybrids have been obtained by back-crossing to the American parent, and ten segregates from back crosses have proved superior to Suyog and Co. 2. Continuous selection has led to improved yields. Special attention is now being given to selection for long staple and resistance to diseases and insects. Experiments are also in progress to transfer to cultivated cottons some of the desirable characters of wild cottons by back-crossing or by the polyploidy techniques.

The aim at Jalgaon is the production of a strain superior to Jarila in ginning outturn and at least equal to it in other characters. Two segregates from the cross Jarila x NR have proved superior to Jarila; 197-3, which is better than 670-4, has been selected for extensive trials.

At Dharwar and Gadag the new strain 2-3-68 has proved better than Jayawant in agricultural characters. The superiority of strain 9-3, from the cross Gadag x Co. 2, over Gadag 1 in the Dharwar-American cotton tract was confirmed.

Progress in the breeding of wilt immune varieties is reported. Some cultures of the cross Vijay x 1027ALF have suffered no mortality in pot culture tests. The cultures of the back cross are also wilt resistant. Other promising wilt resistant selections are also mentioned. Experiments on angular leaf spot have shown that the New World cottons have varying degrees of susceptibility to this disease whilst many of the Old World cottons are resistant to it.

Sisal

Various agave species are being tested for their suitability for cultivation under different soil and climatic conditions.

Sugar cane

Varietal susceptibility to attacks of sugar cane pests is being studied in relation to climate.

Tobacco

Four promising selections of Piliu, superior to the local types in yield, have been obtained. Two of them are also superior in quality. One segregate of a composite cross between Keliu, Saijpurui and NT5 was outstanding as regards yield and quality. Crosses between bidi and cigarette tobacco varieties made for obtaining hybrid vigour have given strains yielding up to 15% more than the parental variety Saijpurui. The economic aspects of hybrid seed production are being investigated.

Varietal tests at Nipani are reported. F₄ hybrids of crosses made between various cigarette types to combine quality and yield are under investigation. Crosses between Nipani and Nadiad types of bidi tobacco have been made.

Chilli

Promising selections from bulk samples are being tested.

Oilseeds

Work on the genetic improvement of linseed, sesamum, safflower and niger is being carried out.

Improved strains and selections which did well in trials are mentioned.

Pulses

Work on the improvement of gram, mug, udid, matki, kulthi and tur is reported. Gram selections showed greater wilt resistance as well as greater yield than the local types. Some highly resistant progenies are mentioned. Selection of tur for resistance to *Fusarium* wilt is in progress at Arbhavi.

Other vegetables

Foreign and Indian vegetables have been included in trials, and 147 promising strains have been selected for further work. The selection of suitable strains of onions and sweet potatoes has been undertaken at Padegaon where collections from different parts of the province have been grown.

877.

Rapport Annuel pour l'exercice 1948. (**Annual report for the financial year 1948**).

Publ. Inst. Nat. Agron. Congo Belge 1949 : Hors Sér. Pp. 290.

This annual report (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2229) from the National Institute for Agricultural Research, in the Belgian Congo, records the establishment of a new research station at Kaniama where tobacco cultivation will be among the subjects studied. Other information of interest to plant breeders is summarized below:—

Pyrethrum

Selection at Mulungu Tshibinda is directed towards abundant flowering, desirable morphological features, high content of pyrethrins and resistance to bud rot due to *Ramularia bellunensis*. Seedling and clonal selection is proceeding successfully. In the seed plantations vigorous bud rot resistant clones have replaced inferior types.

Wheat

At the Kisozi Experimental Station selection for better baking quality is in progress. High yielding, early, rust resistant, bearded wheats with short stems have been distributed to native growers, and yields have been more than doubled.

Maize

The Food Plant Division of the Yangambi Research Centre is working on the production of a synthetic hybrid by Hull's method. The parent material having first been selfed, crosses have been made between Turumbu, the Z 158/2 lines and the 90-day maize on the one hand and the best introductions on the other. Each of the 41 hybrids thus obtained has then been crossed with others and the best ears from the offspring were used for further crosses.

Selection to obtain a yellow, corneous type with its greater resistance to weevils is proceeding. About 100 new varieties have been introduced during the year. Selection of early and late types is in progress.

Hybridization at Bambesa Experimental Station is to be effected to obtain a high yielding, early type of commercial value with vitreous kernels. The programme will begin with the crossing of yellow early maize by 19 lines from Yangambi.

A multiplication of Petit Blanc Hâtif [Small White Early] has yielded 1900 kg. of dried ears per ha.

At the Gandajika Experimental Station, lines are being purified for use in top crosses and to test their value in hybridization. Additions to the breeding material include 32 hybrids

of Gandajika x Hickory King de Nioka back crossed four times to Gandajika and 49 American lines recently introduced.

Four lines purified by repeated selfing have, when top crossed, surpassed improved Gandajika in yield and are to be crossed to obtain a double hybrid superior to improved Gandajika.

The most promising F_1 selections from numbers of simple and double hybrids are being back crossed to improve Gandajika or a synthetic population GPS 1. Hybrid strains of Gandajika x Hickory King de Nioka have undergone back crossing and will be analysed by top crossing after purification.

Variety trials show the increasing yields of GPS I and its hybrids.

At the Kiyaka Experimental Station the improved Gandajika hybrid 391 x 351 F I yielded best.

The lines produced at Kisozi Experimental Station have doubled the native growers' yields. Greater earliness is still required.

At the Rubona Station the best yields included those from the Rubona hybrid, Plata jaune Yangambi and Kisozi 1946.

At the Nioka Experimental Station selection of early lines is being continued to obtain material for hybridization.

Eleusine

From specially chosen mother plants or from introductions, 24 lines have been under observation at Nioka Station for yield, uniformity in height, and maturity, resistance to diseases and pests, tillering capacity and other features.

Sorghum

The numerous criteria in the selection work in progress at Nioka Station are set out; 119 varieties were introduced from Irumu, Yangambi and the USA.

At the Rubona Station 34 élite lines from the locality are undergoing comparative trials. The best yields were from Rudasakwa 015, Amagunu 03 and Nkonkoma 020.

Rice

At the Food Plant Division of the Yangambi Research Centre, about 600 crosses were made with the best native varieties, used as parents, and foreign varieties, in particular those with a long vegetation period, as pollinators. Out of 30,000 pollinations, 11% succeeded and 61% of the seed germinated.

The aims in selection vary according to harvesting methods and the place where the crop is to be grown, e.g. plain or marsh; the plan to be followed with hybrid material is set out and a table shows the yields and other characteristics of various lines tested in 1948.

Coix Lacryma-Jobi

At the Food Plant Division of the Yangambi Research Centre, selection of mother plants is in progress, high yield, tillering, vigorous root system and high quality grains being among the objectives. In a comparative trial of 82 lines, half of them outyielded the control and four short, stout mother trees will undergo further selection.

Pasture grasses

At Nioka Station a study is in progress on the value of local and imported grasses and their possibilities in mixtures. A collection of forage crops including grasses and legumes has been assembled.

Potato

At Nioka Station eight selections of Kisozi, Kruger and Afrique du Sud are undergoing trials.

At Kisozi Station, though the new introductions have not done well, some crosses have been promising as regards earliness, yield and *Phytophthora* resistance.

Sweet potato

In trials of 18 clones at the Nioka Station the most productive have been 09, Triumph, 05, Pedro de Lade, 4 and 0173.

Cotton

At the Bambesa Experimental Station the search for new lines involves both selection of mother plants and observations of plots of élites with reference to yield, habit, pest

resistance, quality, length and percentage of fibre, and the number of bolls. The best plants are retained for selfing and sowing in a series of élite plots.

Among the élites, line 51 is remarkable for its long fibre and high ginning outturn and Stoneville 2/180 shows high yield and high ginning outturn, but its fibre length must be improved; with Stoneville 5/90 and 3/B, it is to undergo comparative trials and tests for wilt resistance.

In isolation plots it was observed that the more pubescent varieties, MU/8, Cambodia and their hybrids, suffered less from pest attack.

Hybridization work is in progress and a collection of foreign varieties is also being built up. Stoneville 0/4 and 270 D64 have yielded well in trials at the Bokata Centre, Ubangi. Both varieties as well as Stoneville A, Stoneville 5 and Triumph are to undergo spinning tests. At the Gandajika Experimental Station, the extensive cotton improvement programme includes pedigree selection and large scale hybridization work and variety trials including tests for wilt resistance. Fibre analyses and spinning tests are also to be used in determining the commercial value of new varieties or strains.

At the Lubanka Experimental Station 1700 selected pedigree lines are undergoing trials for yield, length and percentage of fibre. The material includes hybrids, back crosses and multiple crosses. The relative yields of the two best groups were 190.4 for the multiple crosses (134.1200 x 14.125) x A 42 and 179.0 for Allen Bebedja x 14.125.

Other Fibre plants

The Gimbi Experimental Station is investigating the possible value of various fibre plants including numerous *Hibiscus* species. Technological studies have shown the superiority of *Urena* fibres to those obtained from *Abroma*.

The following work has been done on *U. lobata*. Evidence regarding hardiness and drought resistance has been collected. Mass selection of the variety Luozi has produced plants with superior growth and technological properties as compared with the improved Vuazi variety. Pedigree selection is giving encouraging yields, and fibre samples of the best lines are being sent to Europe for analysis.

Out of nine élite lines undergoing comparative trials, SCE 7, SCV 125, SCV 14, SCV 117, 4.26 and M 71 have outyielded the controls.

Ten varieties are undergoing retting tests.

Cassava

The Food Plant Division of the Agronomic Research Section of the Yangambi Research Centre records about 922 crosses of 13 of the best varieties, and about 3000 other crosses. Though in both lots the set was about 30.8%, the ripe fruits less than two months after crossing contained only sterile or malformed grains. Preliminary selection for various economic characteristics, including resistance to diseases and lodging, desirable habit and suitability for harvesting by leverage, has been begun.

Imported clones are still being tested at the Nioka Station. Yield figures for 24 clones registered since 1941 are given.

Selection for high yield and resistance to mosaic is proceeding at Mulungu Tshibinda. Rubona 749 and 750, Kenya 8, N'tolili and Gongana Butu are among the best yielders.

At the Gandajika Station a preliminary trial of 62 varieties for mosaic resistance, HCN content and yield per plant and per root showed S 0196, Airpin Java, Sao Pedro Petro, S 0647, St. Av/1, S 061 and S 097 to be the most promising varieties.

In a trial of 15 varieties at the Lubarika Station the best yielders were the two sweet forms, Ngunga na Butu No. 5 and Yangambi Selection, and Eala 07 Rubona.

Yam

The criteria in the selection work in progress, under the direction of the Yangambi Research Centre, are shape, and culinary and dietetic qualities of the tubers. A comparative trial includes 11 varieties.

Amaranthus

At Nioka Station, a collection has been established with nine imported varieties and the progenies of ten selected mother plants. The varieties Libi and Djerba have yielded 255 and 152 kg. per ha. respectively.

Coffee

The Botany Division of the Yangambi Research Centre records that wild types of *Coffea congensis* have been introduced in the Tshopo region with a view to hybridization, and that the collections of indigenous coffees are being reclassified.

At the Yangambi Research Centre, the *robusta* types derived from wild *Coffea canephora* have shown widespread mortality, due, it is thought, to the presence of *liberica* genes in the initial material with consequent high susceptibility to fungous disease. Samples have been taken from 96 different plots to determine the properties of the commercial product.

Seed from various wild *C. congensis* forms from the banks of the Tshopo river will be used for experimental plantations and for hybridization work with *C. canephora*.

Interspecific hybrids of the *congusta* type have been vegetatively multiplied for grafting in isolated monoclonal plantations of *C. robusta*.

Selection of various lines is being continued and the plots are being reviewed from the standpoint of systematic classification with the aid of the Botanical Division.

The polyclonal plantation has acquired 15 new élites and the isolated monoclonal plantations for the production of legitimate seed for comparative progeny trials have been increased by 76 plots, 39 comprising new élites, and the rest, plants derived from mother trees from Lula. Yields of nine Mulungu clones of *Coffea arabica* were recorded at the Nioka Experimental Station.

At the Kondo Experimental Station the four best trees of local forms of *Coffea robusta* were S 19, S 23, S 9 and S 14, the first named yielding twice as much as SA 158, the best imported clone.

Among the clones grafted on various stocks, SA 158 has again yielded best, but wild *robusta* scions have ranked high in yield and size of beans.

At the Bambesa Experimental Station the lines L/120 and L/27 have maintained their superiority in yield, with 5 kg. of fresh berries per tree. The mother trees SA/34/115 and L/396/116 yielded 16.0 and 13.5 kg. of fresh berries per year.

Cacao

Selection of the Mobwasa lines, obtained by controlled pollination and situated in the 1924 Yangambi plantation, is proceeding, as well as observations on the illegitimate progenies in the different plantations established for the study of early types, Criollo types, and bean characteristics.

At the Kondo Experimental Station, Criollo x Forastero hybrids are being observed for yield and physical characteristics of the pods.

Offspring resulting from free pollination of K 412 were planted in 1947 and a collection of progenies from a tree of Djatti Roengo in cultivation at Vuazi has been made.

Aleurites

The Mulungu Tshibinda Station is engaged in the selection of clones and selfed seedlings. *A. montana* x *A. Fordii* hybrids have been found to cross normally. The floral biology of *A. montana* is being studied. Inflorescences bearing male and female flowers are rare.

Oil palm

At the Technological Division of the Yangambi Research Centre varieties are being studied in an attempt to draw up a classification based on fruit colour; the rate of oxidation of the oil is also being noted as an important feature in selection work.

The Oil Palm Division at Yangambi is continuing to select for yield and quality, the ultimate aim being a disease resistant palm of the *albescens* type, whose fruits show little pigmentation. Other desiderata are a short stem, an annual yield of about 150 kg. of crowns each containing at least 30% of oil. Out of nine of the best lines at the station 17 élites have been chosen on the above basis and are now being crossed and selfed.

Some *albo-nigrescens* and *albo-virescens* varieties in the Yangambi collection are being used in a genetic analysis of the *albescens* character, i.e. absence of carotene in the pulp.

Crossings and selfings of *Elaeis melanococca* have been made as well as some interspecific hybridizations.

Seed from *tenera* x *dura* and *dura* x *pisifera* crosses was distributed to native and European planters; 5800 trees were artificially pollinated and about 11,000 crowns analysed with a view to the selection of new seed bearers.

At Kondo Experimental Station yields of pedigree plantations and experimental fields have been recorded. Yangambi lines and hybrids are undergoing comparative trials.

Cinchona

At the Mulungu Tshibinda Station selection of clones and of legitimate seedling progenies was carried out and a test plantation of 26 élite clones was laid out to compare their resistance to *Helopeltis*. Among the seedling material the hybrid 228 x 278 showed high resistance to dry conditions.

The flower and fruiting characteristics of various clones under different conditions were recorded; and both intraclonal variations in quinine content and the variation in relation to the place from which the sample is taken on the tree were investigated.

Plants from seeds treated with colchicine or sanguinarine were slightly superior to the controls in development.

At the Rubona Station, the *C. succirubra* and cinchona hybrids from Malabar show vigorous growth.

Hevea

At the Yangambi Research Centre the preliminary results of preselection tests, based on the vigour of nursery plants and on the early production test, reveal no correlation between growth and productivity, but indicate (1) that vigorous plants retain their initial advantage and (2) the marked superiority in yield of plants classed by the Testatex method (cf. *Plant Breeding Abstracts*, Vol. XI, Abst. 195).

Mother tree selection is proceeding and yields of 1940 and 1941 seedlings have been recorded.

A new test plantation has been established in 1948 to test the performance of vegetative progeny of mother trees selected at Yangambi and elsewhere. The effects of spacing and arrangement of lines in seed gardens are also being investigated.

The clones A 49, BD 5 and M 4 have shown resistance to brown bast. In the seedling plots the highest yielding clones were most susceptible to brown bast.

Observations at the Bongabo Plantation included measurements of clone growth under various treatments and wind resistance of various clones.

At the Mukumari Plantation, records were kept of (1) the growth of clones and clonal families, and (2) the wind resistance of the susceptible clone Tj 1 when interplanted with lines of the resistant clones BD 5, Av 49 and Av 152.

Clones and lines are under observation at the Kondo Experimental Station. Av 50, BD 10, B2, Tj 16 and Av 152 are noted for their vigorous growth.

At Bambesa in the 1939 experimental plantation, out of 15 clones, M 4, M 5 and Tj 1 have yielded best.

Mango

Seedlings and clones are under observation at the Vuazi Experimental Fruit Station.

Groundnut

The Food Plant Division of the Yangambi Research Centre records the introduction of varieties of *Arachis hypogaea* from South Africa, USA, Argentina and Mahagi territory, all differing markedly in vegetation period, average weight of seeds and thickness of shells.

About 700 crosses were made between lines A 20 and A 65 on the one hand and the best introductions on the other.

The choice of mother plants with desirable characteristics and of élites from about 2000 mother plants from crosses is in progress.

At the Bambesa Experimental Station selection is being carried out for yield and earliness, and 130 lines are under observation.

A collection has been made of varieties from Uele and Yangambi.

There are nearly 40 native and foreign varieties in the isolation plots.

Work at the Gandajika Experimental Station includes selection, multiplication, germination studies, acclimatization and observation of foreign varieties, comparative trials and local variety tests on different types of soils.

At the Rubona Experimental Station the most productive varieties were Mputu A, 0574, Senegal and Kiehusa from Yangambi and Kigan and A 26 from Gandajika.

At the Lubarika Experimental Station about 50 varieties from the Gandajika Station are under observation. The local variety, in contrast to previous results, has proved more

productive than the selected Gandajika varieties, Kigan, A 26, A 65 and A 66, probably owing to deficient germination of the latter.

At Kiyaka Experimental Station the best yielders were Local Nguba, Local Mukongo and Mukongo Muboma. Small scale multiplication plots have been laid down with 106 lines and varieties from Yangambi and Gandajika.

Avocado

At the Keyberg Experimental Station some varieties of *Persea drymifolia* and *P. americana* and some Guatamala hybrids of these two species were introduced.

Banana

At Yangambi seedlings are being raised for cytological study and hybridization work. Crosses between *Musa acuminata* and the best varieties of plantain will be ready by 1949. Vegetative selection is also proceeding. Indigenous varieties of plantains are being studied to ascertain the best mixture for native cultivation.

Legumes

At the Yangambi Research Centre, erect and climbing forms of *Phaseolus angularis* were isolated in 473 progenies from initial material and over 139 promising selections were retained. *Ph. aureus*, *Ph. lunatus*, *Ph. Mungo*, *Ph. vulgaris* and *Ph. calcaratus* are under observation.

Hybridization, both artificial and natural, has produced material for selection for length of vegetation period, number of pods and seeds, and colour and average weight of the beans. At Nioka Station observations of *Ph. lunatus*, *Ph. angularis* and *Ph. coccineus* suggest that the last named may be worth growing.

Mulungu Tshibinda Station records the introduction of 86 varieties of *Phaseolus*. The collection now comprises 110 varieties of *Ph. vulgaris*, *Ph. lunatus*, *Ph. multiflorus* and *Ph. angularis*. In variety trials yields and resistance to anthracnose and *Melanogromyza* have been recorded. Acclimatization tests at 2000 metres are in progress.

At the Gandajika Station species of *Phaseolus* are being collected for selection and a herbarium of native legumes is being gradually established.

At Bambesa Experimental Station an initial classification has been made of forms of *Ph. angularis* according to bean colour and plant habit.

A white variety of soya bean has been multiplied.

At Nioka Station soya bean varieties tested included Otootan, Tarruel and Herman.

878.

Annual Report of the Department of Agriculture, Uganda Protectorate for the period 1st April, 1947—31st March, 1948. Part II. Experimental. 1950 : Pp. 96.

Maize

Breeding work on white and yellow Kenya strains has been initiated; the highest yielding types are K4, K5, K6, K13 and K15.

Potato

Some of the South American potatoes obtained from the Commonwealth Bureau of Plant Breeding and Genetics have shown promise in their first season of trial in small observation plots.

Sweet potato

A trial was carried out on the varieties Kalebe, Namujuna, Kayulu and Mameita, using three planting and three lifting dates. Among the new types tested the West Indian yellow fleshed variety has produced good yields and proved to be very palatable but it does not keep long in the ground after reaching maturity.

Cotton

Breeding work is reported (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 388).

Cassava

Mosaic resistant varieties and susceptible standards were tested; one of the former, No. 36, has yielded at six months 7.8 tons per acre.

Coffee

A trial of selections of the spreading and erect types revealed marked and consistent differences between strains as regards yield.

Banana

Varieties of nkago or cooking banana were tested.

Soya bean

Varietal testing continued.

879.

**Annual Report of the Department of Agriculture, Zanzibar
Protectorate 1949 (1950) : Pp. 64.**

In addition to variety trials of air cured tobacco, yam, cassava and other crops the following work is briefly reported:—

Rice

Selection of the higher yielding varieties for high tillering capacity continued at Kizimbani.

Cacao

The progeny of the "Bule" trees Nos. 2 and 3 planted at Matangatwani have been differentiated into two pod types; samples of fermented beans from both are to be tested. It is hoped that it will be possible to obtain a high yielding strain with good sized pods by crossing No. 3 with ordinary Dunga Criollo cacao.

Oil palm

Seed obtained by crossing selected *dura* mother trees with pollen from the types *dura*, *tenera* and *pisifera* has been received from the Oil Palm Research Station in Nigeria and planted at Kizimbani and Limbani.

880.

HAYTER, C. W.

**Summary of Annual Report of the Horticulturist for the year
ended 31st December, 1949.**

Rhod. Agric. J. 1950 : 47 : 312-15.

BROWN, D. D.

**Summary of Annual Report of the Chief Tobacco Officer for the
year ended 31st December, 1949.**

Ibid. 1950 : 47 : 321-26.

McLOUGHLIN, D. E.

**Summary of Annual Report of the Chief Agriculturist for the
year ended 31st December, 1949.**

Ibid. 1950 : 47 : 352-55.

Maize

Work on the development of hybrid maize continued. Double hybrid seed for commercial use made its début in 1949.

Tobacco

In trials at the Trelawney Research Station, Bonanza, Yellow Mammoth and C7, a hybrid between Jamaica Wrapper and Bonanza, gave the best results. Introduced and local tobaccos are under test at the new Cigar Tobacco Experiment Station established at Chipinga.

Fruits

Further selections of the strawberry Salisbury were made at the Sub-tropical Experiment Station, Umtali. Observations on the performance of varieties of avocado, mango and other fruits at this Station are briefly recorded.

881.

Progress Report of the Division of Horticulture, Central Experimental Farm, Ottawa 1934-1948.

Dep. Agric. Canad. Pp. 259.

In addition to the report of the work summarized below, information is provided on varieties of fruits and vegetables recommended as a result of trials.

Potato

The Ottawa Central Experimental Farm has taken part in the National Potato Seedling and Variety Trials inaugurated in 1947.

Apple

Varieties earlier than Melba but resembling this variety in appearance and quality are being distributed for trial. They have all originated from crosses between Melba and Crimson Beauty; the three most promising are 0-272, 0-274 and 0-277. Other new early varieties under trial are 0-244 (McIntosh x Duchess) and 0-294 (McIntosh x Fameuse). 0-244 is an improved Duchess type, ready for picking in early September; its fruits are too small for commercial purposes but the variety may prove useful for domestic planting. 0-294 ripens a few days earlier than McIntosh and appears to be more hardy than this variety; it produces attractive fruits of commercial size, superior in quality to those of Duchess.

A search is being made for a variety later than McIntosh; several late varieties have been introduced for trial but none is at present recommended for extensive commercial planting. Colchicine induction of tetraploids was begun in 1947; experience gained in the technique of treatment is summarized. Where seed is plentiful, germination of afterripened seeds on filter paper soaked with 1.0% colchicine solution is considered the most suitable method. Tetraploid material is being produced with three objects: (1) determination of the effect of tetraploidy upon fruit size; (2) hybridization between tetraploids and diploids to form triploids; and (3) crossing between tetraploids of very small fruited hardy species and commercial apples, since it may be possible to secure good fruit size in the F_1 , whereas diploid material would require back-crossing to a commercial variety to attain the requisite size.

Acenaphthene treatment of germinating seeds of *Malus baccata* was unsuccessful in producing tetraploids.

Varietal differences in response to gas storage have been studied.

The method of cold treatment and subsequent exosmosis of electrolytes does not give a completely reliable indication of hardiness; possibly a more refined technique would provide figures more nearly in line with field observations.

Pear

Breeding work continues with the aim of developing pears with good quality, hardiness, suitability for both canning and dessert, good keeping quality and fire blight resistance. Hybridization is in progress, use being made of the better standard pears, the varieties Enie, Menie, Miney, Moe and Phileson developed at Ottawa, and a number of hardy but otherwise undesirable varieties, seedlings and species.

Plum

The results of the hybridization programme show that hybrids between Japanese varieties and varieties derived from *Prunus americana* and *P. nigra* offer good opportunities for the production of hardy, large fruited plums with high quality.

The following five seedlings have shown particular promise: Algoma (0-302), a very hardy cherry plum from the cross *P. Besseyi* x Burbank (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1339); Grenville (Burbank x *P. nigra*), a large, red fruited, early maturing dessert variety; 0-306 (*P. bokhariensis* x Wickson); 0-308 (*P. bokhariensis* x Wickson); and 0-3010 (Burbank x Wickson). The latter three seedlings are not quite hardy enough for Ottawa but are being distributed for trial in mildew regions on account of their good fruit characteristics.

Current breeding work is largely centred on hybrids between Japanese and native species, but attention is also being given to other combinations. Crosses between Japanese x native hybrids and the *P. Simonii* represented by Kaga, Superior and Toka, may be readily

effected. The cherry-plums, or hybrids between *P. Besseyi* and Japanese varieties, are extremely hardy and will cross with the Japanese varieties and *P. Simonii*; they would appear to offer promising material for improvement. An attempt is also being made to develop improved, hardy plums of the European type by using suitable *P. domestica* forms.

Cherry

A few seedlings from crosses between Montmorency and 0-241, a selection of the hardy Russian variety Vladimir, offer some hope that it may be possible to produce hardy sour cherries, equal in size and quality to Montmorency.

Work on increasing the hardiness of sweet cherries has met with less promising results. Attempts to cross the sweet cherry with *Prunus pennsylvanica*, *P. virginiana*, *P. tomentosa* and *P. Besseyi* have been unsuccessful. Triploids with a high degree of sterility have been obtained from crosses between hardy varieties of sour cherry ($2n = 32$) and sweet cherry ($2n = 16$); many of these triploids are hardy in both wood and flower bud. The progeny of these triploids show chromosome numbers ranging from $2n = 24$ to 40, the majority of the seedlings being aneuploids with intermediate chromosome numbers.

Selection of *P. fruticosa* has resulted in seedlings with fruit up to three-quarters of an inch in diameter. The seedlings are being crossed with Montmorency and other sour cherries to improve the flavour and increase fruit size, while at the same time retaining the bush habit. Three promising selections of *P. tomentosa* are being propagated for trial: 0-311, with very early maturity and a high degree of hardiness; and 0-312 and 0-383, both with large fruit. Two-year-old seedlings with doubled chromosome number have been obtained by colchicine treatment of triploid seed from the cross sour cherry x sweet cherry.

Filbert

Selection within *Corylus americana* and *C. cornuta* has been carried out. Four of the best seedlings of *C. americana* have relatively large nuts with thin shells, clean kernels and good flavour. Little variation has been observed in *C. cornuta*, all the seedlings bearing small nuts. Recently crosses have been made between *C. americana* selections and European varieties with large nuts and good quality.

Raspberry

Five seedlings were distributed under the names Gatineau, Madawaska, Ottawa, Rideau and Trent in 1943. Two other unnamed seedlings, 0-201 (Newman 23 x Herbert) and 0-263 (Newman 23 x Lloyd George), have shown promise. Information has been gained on the relative value of different parental combinations. Crosses between Lloyd George and Newman 23 have been especially valuable in breeding. Combinations between Ottawa [Viking x (Loganberry x St. Regis)] and Lloyd George x Newman 23 appear to offer promising material. Notes are included on the reaction of varieties to mosaic, leaf curl, leaf spot and other diseases.

Red currant

Promising rust resistant selections have been secured from crosses of the resistant variety Viking with Cascade, Red Lake and Stephens 9. Resistance is dominant to susceptibility. Viking is also less heavily attacked by aphids than other varieties; a selection highly resistant to aphids has been obtained from the cross Viking x Stephens 9. *Ribes diacantha* from northern Asia is also aphid resistant but on account of its small fruit size is a less valuable parent than Viking.

Black currant

Two rust resistant seedlings, 0-381 and 0-393, both from the cross *R. ussuriense* x Kerry, have been named Crusader and Coronet respectively (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1270). Preliminary data indicate that rust resistance is inherited as a dominant monofactorial character in crosses between *R. ussuriense* and susceptible varieties.

Gooseberry

The sole aim of breeding has been the development of thornless varieties. This work began with the crossing of the English gooseberry Victoria with a thornless plant of *Ribes oxycanthoides*; the cross between a thornless F_2 plant with the American variety Mabel resulted in the variety Spinefree. At present six promising selections from the cross between Spinefree and Clark, a large fruited thorny variety of the English type, are being

multiplied for extensive testing. The seedlings are not entirely thornless but their thorns are so short that they do not interfere with fruit picking. Thornlessness is recessive to the thorny condition; from the different degrees of thorniness encountered it is evident that several pairs of genes are involved.

Blueberry

In the Maritime Provinces selected native seedlings of high bush blueberry are under trial on different soil types in comparison with named varieties introduced from the USA.

Elder

Improved forms of *Sambucus canadensis* are being developed at Kentville, NS.

Strawberry

Breeding work has been directed towards the production of both early and late maturing varieties with improved yield, firmness, appearance, quality and disease resistance. New varieties introduced during the period under review comprise Elgin, King, Louise, Mackenzie, Tupper and 0-371 and 0-374. The two last named varieties, derived from Fairfax x King and (Easy Picker x Ettersburg 80) x Fairfax respectively, require further evaluation.

Information is provided on the value of the following varieties as parents: Claribel (Ettersburg 121 x Cassandra), Dresden, Fairfax, Geneva 7225, Louise, Premier, Valentine and 0-371.

In breeding for disease resistance, attention is being devoted to resistance to *Sphaerotheca Humuli*, *Mycosphaerella Fragariae*, *Diplocarpon Earliana* and *Dendrophoma obscurans*. Recognition of the presence of virus infection also plays an important part in the breeding programme.

A number of varieties have shown little or no attack by leafhopper. A thick, tough hairy leaf was associated with freedom from leafhopper in most of these varieties; but such a type of leaf is not entirely responsible for this freedom since *Fragaria vesca* and *F. virginiana* were also unattacked but possess soft thin leaves.

Inbreeding has been carried out with the purpose of producing: (1) inbreds that might exhibit hybrid vigour upon crossing, and (2) lines homozygous for certain desirable characters that could be used in breeding. Virtual homozygosity for several characters was secured in some S_4 lines. Recombinations at the S_2 , S_5 and S_4 levels failed to show any appreciable improvement over the parental inbreds. Top-crossing appears to offer promise. The fact that inbreds may carry undesirable dominant characters in addition to desirable ones may complicate the use of inbreds in top-crossing; investigations are being carried out to discover how far this disadvantage may be overcome by back-crossing.

The results of crosses made between *Fragaria* species with different chromosome numbers are summarized.

Cranberry

Native selections and the varieties Early Black and Howe from Massachusetts are under test at Aylesford, NS.

Garden beet

Individual plant selection of Detroit Dark Red has resulted in an improved strain, darker in colour than the parent variety.

Carrot

An improved strain of Chantenay, designated No. 27 in 1945, has been produced by individual plant selection; it has proved popular among growers on account of its appearance, colour, flavour and storage qualities.

Radish

In tetraploid production by colchicine treatment good results have been obtained by germinating seeds on filter paper soaked with 0.05, 0.1 and 0.2% solution for 24 hours and with 1.0% for 1 hour. The tetraploids varied considerably in fertility but selfed seed has been secured from most of them. Interpollination among the tetraploids has resulted in a good supply of seed which is to be planted in varietal trials.

Acenaphthene was of very limited value as a polyploidizing agent.

Onion

Two promising hybrid selections are noted: Ottawa ON-1 (Flat Red x Yellow Globe Danvers), a medium sized, exceptionally early maturing onion with good keeping quality, and Ottawa ON-2 (Bermuda x Ebenezer), also with good storage quality but not quite so early as ON-1.

Asparagus

A selection of the variety Elmira was named Eden in 1945. It produces long, compact, brittle spears; the lateral buds and leaf scales remain compact for a relatively long period making it possible to pack a large percentage of extra long first grade spears. The variety is early, widely adapted and rust resistant.

Tetraploids of the variety Eden have been produced by colchicine treatment. They appear to have stouter stems than most diploid plants but so far they have only been grown in pots in the greenhouse. The tetraploids have been quite fertile.

Spinach

Selection for hermaphroditism has yielded promising lines. It is expected that further work will result in a good strain of Long Standing Bloomsdale which will be completely hermaphroditic in all parts of Canada.

Tomato

Seed of the F_2 and F_3 of hybrids between *Lycopersicon pimpinellifolium* and *L. esculentum* was germinated for 4 days on filter paper soaked with 0.4% colchicine solution. The fruits of the tetraploids produced were smaller than those of the comparable diploids; reduction in fruit size may have been due to lowered fertility. Plants from tetraploid seed are to be grown for further investigation.

Varieties selected from crosses within *L. esculentum* in early breeding work comprise: Globonnie (Livingstone Globe x Bonny Best), Ottawa TO-3 (Abel x Marglobe), Ottawa TO-4 (Rutgers x Allred) and Ottawa TO-10 (ND 303 x Venture). Promising strains selected more recently are: Ottawa TO-14 (Schtambuvy [Štambovy] x Bounty), Ottawa TO-15 (Rutgers x Redskin), Ottawa TO-16 (ND 38 x Early Rutgers), Ottawa TO-17 (Bounty x Early Rutgers), and Ottawa TO-18 [(Jan-ru x Farthest North) x Bounty].

Further breeding was carried out in 1948, several of the well established Ottawa varieties being crossed with other varieties or species. F_1 hybrids from crosses with *L. peruvianum* have proved to be fertile. Hybrids with *L. hirsutum* failed to set fruit and have exhibited a necrosis, observable in a milder form in the *L. hirsutum* parent and apparently genetically controlled.

Breeding for resistance to *Phytophthora infestans* has been initiated. Preliminary tests have not revealed any source of resistance, although San Rais and San Marzano appeared to be less susceptible than the other varieties tested.

Bean

Aims in breeding work include earliness, good quality, stringlessness, yielding capacity and desirable seed type. Four suitable varieties have been developed so far: Ace and Pacer, both from the cross Round Pod Kidney Wax x Princess of Artois, named in 1942 and 1941 respectively; Strider (Stringless Refugee Wax x Princess of Artois) named in 1945; and Ottawa BA-2 (Red Kidney x Unrivalled Wax) which has exhibited some resistance to anthracnose.

Breeding for resistance to halo and common blight is now receiving attention. A list is given of varieties which showed resistance to blight under natural conditions of infection in preliminary test plots during 1948; these stocks are to be more intensively tested for resistance.

Soya bean

A satisfactory type of vegetable soya bean, named Blackeye, has been selected from material introduced from Manchuria in 1934.

Pea

Improvement work has been concerned with the production of canning and garden peas combining early maturity, good yielding ability, high quality and disease resistance. Selection for resistance to root rot (*Fusarium* sp.) has resulted in the varieties Engress

(English Wonder x Laxton Progress) and Laxall (Laxton Progress x Earliest of All) named in 1935 and 1936 respectively, which possess some resistance and have a wide range of adaptability. In 1939 a project of breeding for resistance to *Ascochyta Pisi* and *A. pinodes* was initiated. Physiological races of *A. Pisi* have been identified; the results of tests show that various combinations of resistance and susceptibility to different races of this species may exist in pea varieties. Partial resistance has been located in the strains A-100, A-101, A-107 (a selection of Austrian Winter) and *Pisum sativum* subsp. *elatius*; breeding work is under way in an attempt to transfer this resistance to more desirable horticultural varieties. No useful resistance to *A. pinodes* has been discovered.

Sweet corn

In more recent years breeding work has been chiefly concerned with the production of hybrid varieties. Several promising inbred lines have been produced by selection of named varieties and intervarietal crosses. An early hybrid has been developed from a cross between the inbreds CO-29 and CO-13, designated Ottawa CH-1, which should prove popular in many parts of Canada for fresh use and processing; it is early to midseason in maturity. Brief descriptions are given of six other promising single cross hybrids still under test.

882.

Seventy-fourth Annual Report of the Ontario Agricultural College and Experimental Farm 1949 (1950) : Pp. 110.

Cereals

Further crosses of winter wheat were effected. A new "semimicro" method of protein analysis has been devised for the study of very small flour samples.

Monosomic and nullisomic lines of spring wheat are available for the purpose of genetical studies; it is proposed to develop a similar series for winter wheat.

Oat breeding for resistance to new races of crown rust is in progress.

Barley hybridization continued with a view to combining disease resistance and desirable agronomic characters. Greenhouse tests of resistance to powdery mildew have made possible the detection of susceptible plants in the seedling stage. Crossing is being carried out to increase the hardiness of the winter barley Wong. Protein inheritance is under analysis.

The breeding behaviour of small grains in successive generations is being analysed; this work is accompanied by investigation of the reaction of the new hybrids to individual strains of various rusts.

Work on the production of field maize better suited to conditions in central Ontario has begun.

Forage crops

Breeding is being carried out on cocksfoot, brome grass, timothy, meadow fescue, perennial ryegrass, red fescue, and red Alsike and Ladino clovers. Study of polycross progenies of Alsike clover is under way. New synthetics and hybrids of lucerne from the US Department of Agriculture have given promising hay and seed yields.

Potato

Seedlings from parents possessing resistance to scab, blight and virus were tested as part of the National Potato Breeding programme.

Flax

Promising lines with a high degree of resistance to wilt and rust have been selected. Selection for pasmus resistance is receiving attention.

Tomato

The genetics of late blight resistance is being studied. The development of a true breeding stock resistant to *Septoria* leaf spot is aimed at.

Peas

Varieties have been tested for their reaction to *Ascochyta Pisi* under greenhouse conditions; evidence of physiological races was obtained. Arthur, Famous, Prussian Blue and OAC181 have shown resistance to bacterial blight on the basis of inoculation tests on detached pods.

Soya bean

Breeding work on the variety Mandarin continued. Tests of new varieties were carried out in cooperation with the US Department of Agriculture. Breeding to produce types better suited to conditions in central Ontario has been initiated.

Sweet corn

Extra early inbreds are being developed for hybrid combinations.

883. BLANCO, G.

Agriculture in Mexico.

Div. Agric. Conserv., Washington 1950 : Pp. 52.

Among the many projects undertaken by the Mexican Department of Agriculture, in cooperation with the Rockefeller Foundation, is the genetic improvement of crops (cf. Abst. 153). Those on which breeding work has been started include wheat, maize, rice, potato, cotton, hemp, sugar cane, cacao, pepper, sesame, drug and medicinal plants, rubber, various fruits and beans.

884. RUDORF, W.

Beobachtungen auf dem Gebiete der Pflanzenzüchtung in den U.S.A.

(**Observations in the field of plant breeding in the USA**).

Arch. dtsh. Landw.-Ges. 1949 : 3 : 138-59.

A survey is given of climatic and economic conditions in the USA and of the organization and achievements of plant breeding in that country, with special reference to winter wheat, oats, potatoes, maize and soya beans.

885.

Fifty-ninth Annual Report of the Wyoming Agricultural Experiment Station Laramie, Wyoming 1948-49 : Pp. 48.

Wheat

Wheat breeding and varietal trials were continued at the Afton, Archer, Gillette and Torrington field stations.

Several unnamed selections gave high yields and high yielding named varieties included Onas and Cadet among the spring wheats, and Minter, Nebred and Karkof among winter wheats.

Selections from crosses of winter wheat involving the variety Minhardi were superior to Yogo in winter hardiness.

Oats

New selections, as yet unnamed, have continued to show higher yields than those of established varieties.

Maize

The search for varieties of hybrid maize best adapted to different localities has continued. Yields of new varieties are given, using an adapted local variety for comparison.

Barley

Varietal trials were continued at all the field stations; the highest yield of 125.7 bushels per acre was obtained from a new selection at Torrington.

Forage grasses

Nursery trials of introduced species of *Agropyron* and the native species *Festuca Kingii*, *F. Thurberi* and *Danthonia Parryi* have given promising results.

Leguminous forage crops

The lucerne varieties Meeker, Baltic, Atlantic and Ranger are high yielding under the climatic conditions at Torrington.

Potato

Foundation seed of the variety Bliss Triumph is being tested for virus resistance.

Seedling selections resistant to scab have shown promise.

Although the plants of resistant varieties inoculated with ring rot bacteria had no symptoms of the disease, the virulence was shown to be as high as in a susceptible plant. Varieties differed in the length of retention of a virulent infection.

Broccoli, cauliflower and spinach

Varietal differences in ascorbic acid content were noted.

Snap bean

Selection and breeding are continuing in attempts to combine resistance to several diseases with high yields of good quality in the same plant.

Varietal differences in ascorbic acid content have been recorded.

886.

Science for the farmer. Sixty-third Annual Report of the Pennsylvania State College Agricultural Experiment Station, State College, Pennsylvania 1950 : Bull. No. 529 : Pp. 60.

Wheat

One Pennsylvanian strain has shown promising yielding ability.

Oats

Continued testing shows that three unspecified varieties of winter oats may now be grown in southeastern Pennsylvania.

Maize

Early and late hybrids are being released, and new selections have been made from Oh 40B for higher magnesium accumulation. Material with a high degree of blight resistance continues to show resistance in root rot tests, but from 157 disease resistant lines tested last year for seed increase, 36 proved susceptible to new races of *Helminthosporium turcicum*.

Barley

Field and experimental tests with new strains are continuing.

Potato

A new blight resistant potato 2XJ-1 has given higher yields of smooth tubers than Russet Rural, which it may substitute as a chipping variety. BP-7 is continuing to produce higher yields and smoother tubers than Cobbler.

Tobacco

Breeding for wildfire resistance has produced two resistant lines whose growth compares favourably with Swarr-Hibshman, an accepted, though susceptible, variety.

Lettuce

Two new strains, resistant to tipburn, have been produced for testing by growers.

Tomato

Back crosses, using a parent derived from a cross between *Lycopersicon esculentum* and *L. peruvianum*, are being made for streak resistance.

New fruit types have been selected, including a long pointed form which may be desirable for slicing.

Use of the male sterile Earlianna strain is recommended for hybrid production.

Peas

Heat unit summations are relatively constant for each variety.

887.

Research leads the way to agricultural progress.

62nd Rep. Md. Agric. Exp. Sta. 1948-1949 : Bull. No. A53 : Pp. 47.

Wheat

Varietal tests continued for yield and rust resistance. The widely used local varieties Thorne, Leapland, Nittany and Mammoth Red were very susceptible to rust, and had low yields compared with three rust resistant selections, Y2375, Y2381 and Y2652.

Maize

Tests of dent and sweet corn hybrids were continued.

Barley

Continued varietal tests have shown that Wong gives high yields in this area. Tennessee Winter has shown marked loose smut resistance, but its yield and other characters are poor.

Potato

Studies of resistance to wilt, late blight and virus diseases have resulted in the substitution of the variety Katahdin for Irish Cobbler on the eastern coast, Pontiac and Sebago for Dakota Red, as late planting varieties, and the introduction of Potomac and Marygold into Garret county.

Pepper

Inbred lines have been obtained by doubling the chromosome number of haploid plants obtained from twin and triplet seedlings in attempts to produce new hybrids.

Fruit

Variety trials of peach, apple, and black and red raspberries have continued.

Strawberry

Seedlings capable of producing high quality fruit continue to be tested for resistance to red stele and other diseases. Two resistant varieties, Temple and Frialand, have been released.

Tomato

Breeding for greater resistance to cracking and late blight has made progress.

Soya bean

Yield tests of twelve varieties were made.

888.

Science serves your farm.

Bull. W. Va Agric. Exp. Sta. 1950 : No. 342 : Pp. 38.

Spring oats

The new variety Andrew (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 246) developed by the Minnesota Agricultural Experiment Station is well adapted to West Virginia; it is an early maturing, yellow grained oat with good standing ability and has proved to be resistant to crown rust, smuts and all prevalent races of stem rust except race 8.

Maize

Hybrid production is in progress. Work on breeding high yielding hybrids for the regions of higher altitude with short growing seasons is under way.

Winter barley

The new variety Brier produced at the West Virginia Agricultural Experiment Station has outyielded Kentucky 1. An unnamed selection, similar in appearance to these two varieties but taller and later is to be increased for distribution to seed growers; it shows superiority in yielding ability.

Potato

Breeding for disease resistance continued.

Blueberry

Hybrids between the low bush and high bush types are being studied in an attempt to combine the flavour of the native low bush blueberry and improved fruit size.

889.

**Sixty-first Annual Report of the South Carolina Experiment
Station of Clemson Agricultural College 1950 : Pp. 102.**

Varietal tests of the following crops are reported: wheat, oats, barley, grain sorghum, soya bean, snap bean, Lima bean, lettuce, sweet corn, pecan, peach, grape, strawberry and other fruits.

Maize

Tests of open-pollinated varieties and hybrids are reported. The yields, weevil and lodging resistance and adaptability to mechanical harvesting as indicated by size and shape of the ears are tabulated for those tested at the Coast Experiment Station. Considerable progress has been made in developing adapted hybrids at the Pee Dee station.

Crotalaria

Inoculation experiments have shown that the *Fusarium* isolates used fell into three pathogenicity groups, one causing wilt in six of the seven varieties tested, another in five of them and another in three. *C. spectabilis* and *C. juncea* are susceptible to all groups of the fungus while *C. usaramoensis* is resistant to all groups.

Sweet potato

Of 14 new strains developed at the Edisto Station, 12 had a lower percentage of cracking than Porto Rico and there is reason to believe that the breeding of new types may eventually help to eliminate loss through cracking.

Cotton

Varieties from Texas proved suitable for stripper harvesting but their staple was rather short.

Work is in progress at the Pee Dee station to develop long staple Upland cottons equal in spinning quality to imported varieties. For this purpose non-commercial types having very strong fibre with good spinning quality have been crossed with the Sealand strains and have given segregates with fibre stronger than Egyptian and with good length and yield. Sealand 542 compared favourably as regards yield with other long staple Uplands in the 1948 varietal tests. Some progress is reported in developing a strain resistant to *Fusarium* wilt. EH 844, a cross between Tidewater Acala and Coker-Wilds, has proved more productive than Sealand 542; the bolls have better fluff and the fibre is as strong as Sealand although a little shorter.

Tobacco

Four flue cured varieties are compared as regards response to the application of different amounts of fertilizer.

Progress is reported in the development of strains combining resistance to root knot, meadow nematode, Granville wilt, sore shin, black shank and *Fusarium* wilt.

Cayenne pepper

Crosses were made in 1946 between desirable inbreds, and the inbreds and F_1 and F_2 hybrids have since been tested for yield. The figures varied from just under 1000 pounds of dried pepper per acre for the inbreds to nearly 2700 pounds for the F_1 hybrids. Hybrid seed production is expensive because of the hand pollination involved, but the yield data indicate that it should be profitable to plant hybrid seed even though the cost is considerably greater than for ordinary seed.

Sesame

Breeding work is in progress to develop a non-shattering, high yielding variety adapted to mechanization and to the climatic conditions of the southeastern United States. Several desirable lines have been isolated from seed obtained from various places throughout the world. Many crosses have been made between the non-shattering type and the most promising dehiscent varieties. Non-shattering plants may be recognized in the seedling stage by their cupped leaves.

Grape

Among the seedless hybrids from the New York Agricultural Experiment Station, Interlaken Seedless, a cross between Ontario and Thompson Seedless, is outstanding.

Tomato

Line 119EE from a cross made in 1942 of Rutgers with a hybrid between Marglobe and Victor has consistently produced more marketable tomatoes than either Rutgers or Marglobe. It resembles Rutgers in plant type but is three to five days earlier, and sets a much heavier crop on the first cluster. It is not resistant to wilt. It has shown adaptability to a considerable part of the area covered by the Southern Cooperative Tomato Trials. A considerable degree of late blight resistance has been noted in certain varieties and breeding lines including 119EE in experimental plantings at Charleston.

Popcorn

Seven hybrid varieties from Indiana have outyielded Dynamite. Their yields of ear corn and shelled corn are tabulated. Purdee 31, 32 and 38 are recommended to farmers for trial as they have proved outstanding as regards kernel and popping quality as well as yield.

890.

Annual Report of the Agricultural Experiment Stations, University of Florida for the fiscal year ending June 30, 1949 : Pp. 333.

Wheat

Varieties continue to be tested for yielding capacity.

Fair yields were obtained from early selections from North Carolina, carrying rust resistance of the Frondoso type. Testing for adaptation to north Florida continues.

Oats

A new hybrid XM 4111-1-13 [D69-Bond x Fultex (CI 5207)] resistant to *Helminthosporium Victoriae* and *Puccinia coronata* var. *Avenae* has yielded 19% more forage and four times as much grain per acre as Camellia. Reselections from CI 5207 and Hancock-Colo x Fultex (CI 5208) have shown increased disease resistance and other desirable characters.

Maize

Hybrids appear to utilize fertilizer more efficiently than open-pollinated varieties. Yields of open-pollinated varieties are not influenced as much by close spacing as are the hybrid yields, which are superior under similar spacings.

After two years the new hybrid Dixie 18 has produced on the average 40% yield increase over established varieties.

Work on hybrid production continued, including recurrent selection for specific combining ability.

Barley

All winter varieties were susceptible to spot blotch but several spring barleys were resistant. Further testing of spring and winter strains and varieties for grain and winter grazing continued.

Sorghum and millet

Hegari, Early Hegari, Sagrin and pearl millet produced the highest yields in tests of 50 varieties.

Forage grasses

Varietal tests have continued.

Improved Napier grass strains include the high yielding No. 160 but cattle prefer No. 31 with finer leaves and stems.

Argentina Bahia outyielded other varieties of *Paspalum notatum*; Hull's Selection, which is resistant to *Helminthosporium*, gave the second best yield.

Differences in cold resistance were noted among strains and varieties of turf grasses. Strains of *Cynodon Dactylon*, *Agrostis palustris* and *A. canina* were unharmed by subjection to 27° F for seven hours.

Forage legumes

Varietal tests with subterranean clover showed that the highest yielding variety Bacchus Marsh, was severely attacked by mildew in late winter but Tallarook and Mt Barker were resistant and produced high yields.

FC 23213 has been chosen from selections of *Lotus uliginosus* for its outstanding growth. Among selected strains of *Vicia angustifolia* one shows disease resistance and two others early growth.

Velvet bean breeding continued, using selections from F_3 generation hybrids.

Selection and increase of single plant lines of lupin are in progress, with concentration on disease resistance.

Potato

Six of thirteen varieties responded to treatment with ethylene chlorohydrin to break dormancy. No general yield increases resulted from the treatment.

Trials were continued with new blight resistant types developed by the US Department of Agriculture; the highest yields were from B 76-43, Kennebec and B 61-3.

Flax

Yield trials have continued with Victoria leading the 22 strains. All except two, Punjab 47 and Imperial, were resistant to anthracnose.

Sugar cane

Tests are being made for varieties resistant to the moth borer (*Diatraea saccharalis*).

Tobacco

Varietal trials for resistance to black shank and root knot are being carried out. No. 802, a second back cross selection of Rg x White Honduras, showed high yields with resistance to both diseases. Hybrids of Rg x *Nicotiana plumbaginifolia* appeared promising.

Pepper

Florida Giant and some strains of World Beater showed some resistance to *Cercospora Capsici* and produced the highest yields.

Aleurites

Crosses of *A. Fordii* with trees having high yields have produced high yielding progenies after six years' selection.

Guava

Seedlings from the crosses Stone Acid x Speer, Ruby x Stone Acid, Supreme x Stone Acid and Speer x Stone Acid are being observed, and seedlings of Parker's Hybrid, Fan and Red Indian from Natal have been added for test planting.

Groundnut

Improvement by selection of hybrid lines derived from crosses between the Small Spanish and Virginia types is in progress. Dixie Runner continues to give high yields and seed is being distributed.

Comparisons of new hybrids with established commercial types show that yields and kernel characters of certain unreleased hybrids are superior.

Passiflora

P. edulis, *P. edulis* var. *flavicarpa* and *P. laurifolia* resisted temperatures of 30° F. while *P. quadrangularis* died.

Avocado

Different varieties are undergoing tests for tolerance of flooding and fertilizers.

Blueberry

Low chilling requirements formed the basis of selection of rabbiteye blueberry (*Vaccinium Ashei*).

Strawberry

Variety trials were continued to determine the relationship between total yield and planting date. Highest yields were obtained from an early planting with Missionary, Klommore, Tennessee Shipper, Tennessee Supreme and Blakemore.

Clones from Missionary 595, and Klommore 480, selected for resistance to leaf spot and various fruit characters, are undergoing further testing.

A plant of Indian strawberry (*Duchesnea indica*) has been found growing in a sowing of seed of the variety Missionary; it has produced plants true to type and is believed to have a chromosome number of $2n = 84$.

Grape

Varietal trials have continued for fruit rot resistance.

Cabbage

In varietal tests Ferry Morse B was outstanding for its ability to stand without splitting after it had reached cutting size.

Soils free of yellows were used to compare growth of varieties resistant and susceptible to *Fusarium oxysporum* f. *conglutinans*.

Cauliflower

Varieties and strains were grown for yield observations.

Broccoli

No varietal differences in colour were noted in blanching tests. Freezers Green Sprouting appeared to be desirable for freezing.

Spinach

Work on the establishment of inbred lines for the exploitation of hybrid vigour failed completely as vigour was so severely reduced by inbreeding.

Lettuce

Varietal tests with reference to bolting habit showed that Great Lakes and Cornell 456 do not bolt. The new varieties Progress, Penn Lake and Premier Great Lakes resemble Imperial 44 in producing an unprofitable yield of marketable heads when the critical temperature exceeds an average of 70° F.

Celery

Testing continued with several promising blight resistant varieties.

Cantaloupe

Hybrid lines from Smith's Perfect and PR 45 are being selected, which show promise of being earlier maturing than Smith's Perfect and larger fruited than PR 45.

Variety trials for disease resistance were conducted to determine the possibilities of growing this crop in south Florida.

Watermelon

Development of strains resistant to *Fusarium oxysporum* var. *niveum* has continued. The variety Ironsides, from Leesburg x Hawkesbury outcrossed with an inbred line of Garrison, has been released.

Two strains, 46-40 and W 290 developed by the USDA Regional Vegetable Breeding Laboratory, have compared favourably with the standard varieties Cannon Ball and Garrison.

Squash

Varietal tests for resistance to *Peronoplasmodiopsis cubensis* have not yet produced a resistant line. Yield tests were continued.

Cucumber

Some high yielding varieties, including Palmetto, Burpee Hybrid and Puerto Rico 39, have shown resistance to *Peronoplasmodiopsis cubensis*.

Tomato

Winter plantings of replicated variety trials showed that STEP 84, a Missouri tomato, possessed better resistance to *Fusarium* wilt and gave higher yields of good quality fruit than the four commercial varieties Rutgers, Grothen Globe, Southland and Wisconsin 55. Other promising varieties of the STEP series were 68, 89, 113 and 125.

Blossom end rot is less common in varieties having fruits with large scars. Southland and two VCL lines, ASTW 121-4-1-1 and CW 123-1-4-2-1, are least susceptible.

Two new disease resistant varieties Manasota and Manahill have been developed and released. Manasota is highly resistant to *Fusarium* wilt, though somewhat susceptible to blossom end rot. The plant tends to be prostrate and produces heavy yields of high quality fruit in the autumn and winter. Manahill is also resistant to *Fusarium* wilt and to early blight (*Alternaria Solani*) and grey spot (*Stemphylium Solani*). It is slightly later

than Manasota; it has so far proved to be less dependable in its fruiting characters, which are being improved. Its slightly premature release followed an epidemic of grey spot. A true breeding line 210-5-2 with homozygous resistance to tobacco mosaic has been selected for crossing with *Fusarium* wilt resistant lines having improved fruiting characters. Preliminary observations on the character of producing numerous roots at high levels, retained in F₃ generations of crosses between resistant lines and those having moderate root knot resistance, suggest that it depends on possession of a single dominant gene. Breeding work has revealed that late blight resistance, introduced by crossing a newly acquired resistant ornamental tomato with established edible varieties, is recessive. Spring and autumn varieties and strains were included in trials to compare new disease resistant lines with commercial varieties. Conditions were favourable for selection of advanced breeding lines resistant to leaf spot diseases and *Fusarium* wilt.

F₂ generations of disease resistant lines were selected for freedom from autogenic necrosis. Length of storage necessary before the fruit became marketable was determined for 14 varieties.

The different responses of 14 varieties to cultural and picking treatments were recorded.

Egg plant

Two *Phomopsis* blight resistant hybrid selections Florida Market and Florida Beauty have been produced and released.

Beans

Crosses between the snap and Lima bean and between two introductions of the Lima bean have resulted in several promising hybrids.

Rust resistant first generation hybrids have been obtained from Pinto 5 and Ferry Morse 191. The reactions of wax snap bean varieties to canning show that Pure Gold is most suitable, while Cherokee is recommended for the fresh market.

Varietal trials of green snap beans have been carried out for resistance to common bean mosaic, powdery mildew and several strains of rust. Florida Belle is the most resistant variety with high yields.

Yield comparisons have been made of the new varieties Buff Valentine, Top Crop, Rival and Cherokee Wax with standard varieties.

Varietal trials of bush Lima beans to obtain high quality beans for freezing and processing continue.

Pea

Observations on lines segregating from approximately 250 crosses involving English varieties have resulted in the selection of a Thomas Laxton type from N 931 x Teton and a midseason type from Pride x Maul's Giant Sugar Pod. Both are in their fourth generation of selection.

Sweet corn

Of 12 varieties studied, Calumet is least injured by *Euxesta* and *Helminthosporium* while Erie possesses resistance to *Heliothis armigera*. In varietal trials high quality ears have been obtained from Golden Hybrid Sweet, Golden Bantam Evergreen, Calumet and Huron.

891.

Results of research in 1949 by the Agricultural Experiment Station of the University of Kentucky.

62nd Rep. Ky Agric. Exp. Sta. 1949 : Pp. 92.

Winter wheat

The variety Purcam shows leaf rust resistance. New strains of Frondosa x Trumbull-Hope-Hussar, resistant to both leaf and stem rust, are giving promising results, although susceptible to Hessian fly.

Oats

Recently named varieties of autumn oats bred from the cross Lee-Victoria x Fulwin show promise of combining high yielding ability, strong straw, winter hardiness and crown rust resistance.

Maize

Differences in response to 2,4-D have been noted among inbred lines.

Inbreds with a low percentage of breakage below the ear due to corn borer punctures transmitted this character in single, three way and double crosses. Breakage from borer punctures was highly correlated with total breakage; selections can therefore be made for resistance to total breakage with good assurance of obtaining resistance to breakage due to borer punctures.

Several experimental white hybrids were higher yielding than commercial certified hybrids. Of these hybrids Kentucky 423A (US 523W) is particularly promising.

Work on male sterility in certain white hybrids continued but its causes are not yet clear. In line 33-16 male sterility appears to be cytoplasmically inherited.

Winter barley

Experimental strains with some resistance to loose smut and mildew, and as early as Missouri Early Beardless, a barley cultivated in western Kentucky, and with improvements in yielding capacity and straw strength over this variety are being increased for possible distribution.

Grasses

Synthetic strains of smooth brome grass, tall fescue and cocksfoot are under trial, some of which are producing much more early growth than present varieties.

Interspecific and intergeneric hybridization is being attempted. Seeds have been secured from crosses between tall fescue and rye grass.

Tobacco

Burley tobacco plants homozygous for wildfire resistance have been developed by back-crossing plants carrying the dominant factor for wildfire resistance of *Nicotiana longiflora* to burley plants of good type; it is not known whether crossing over has occurred between chromosomes of *N. longiflora* and *N. Tabacum*. Dark fire-cured hybrids homozygous for wildfire resistance have also been produced by back crossing dark fire-cured tobacco on wildfire resistant burley.

The following new disease resistant burley varieties have been bred: Kentucky 26, with improved resistance to black root rot in comparison with Kentucky 16; Kentucky 35, resistant to *Fusarium* wilt and mosaic, and moderately resistant to black root rot; and Kentucky 57, highly resistant to black root rot and resistant to mosaic.

The wild species *N. tomentosiformis* proved to be resistant to the etch virus and a symptomless carrier of the vein-banding virus. The species has the same type of resistance to mosaic virus as Ambalema; this suggests that Ambalema and related mosaic resistant varieties may have had a different origin from varieties susceptible to mosaic.

Varietal differences in susceptibility to leaf spot caused by maize pollen from neighbouring land were noted.

N. glauca and *N. Benavidesii* offer promise as sources of resistance to streak virus in breeding burley tobacco; *N. Arentsii*, *N. cordifolia*, *N. maritima* and *N. Raimondii* may also be useful.

The reaction of 44 *Nicotiana* species to tobacco mosaic virus has been studied.

Popcorn

Experimental hybrids were tested.

892.

Report on agricultural research for the year ending June 30, 1949.**Project reports, publications, financial statement.**

Iowa Agric. Exp. Sta. 1949 : Pp. 336.

Wheat

Variety trials for response to cultural methods showed that the new variety Iohardi, distributed in 1947, gave high yields among winter wheats, and that Mindum and Henry were the highest yielding spring wheats of the ten varieties tested.

Oats

Varietal trials for yield and resistance to common diseases were continued with eleven Bond derivatives; of these Clinton gave highest yields but was susceptible to *Puccinia coronata*

var. *Avenae* race 45. Advanced back crossing of (Clinton x Santa Fe) to Clinton has produced a variety with high yields and appearance similar to Clinton, but resistant to *Helminthosporium* blight, all races of crown rust and common races of smut and stem rust. Resistant selections obtained from the crosses Anthony-Bond x Boone and Mindo x Landhafer are undergoing yield tests.

Studies of infection due to *Septoria Avenae* infection have shown that the present standard varieties are almost equally susceptible.

Susceptibility of crown rust resistant Iowa varieties to the disease when grown in Guatemala suggests racial differences between the pathogens in the two areas.

Field tests have indicated differential responses of varieties to spraying with the butyl ester and amine salt of 2,4-dichlorophenoxyacetic acid for weed control.

Maize

Comparisons of the different varieties and strains now being grown in Iowa have shown that two thirds of these widely grown hybrids have below average yields.

Doubts that the high yields claimed from seed produced in small quantities can be obtained from large scale seed production have been removed by recent experimental results, which indicate that it is possible to produce high yielding hybrids in quantity.

Field maize inbred lines have been multiplied and several lines, including B 8, have been released. Single crosses have produced the early maturing double hybrids Iopop 5, Iowa Hybrid 4417 and 4442; the two first named involve B 8.

Further varietal tests of inbreds resistant to the European corn borer have been made.

Genetically controlled differences noted between the resistance of two lines, Hy and Osf, to corn borers appear to be of a multigenic nature, but these are blurred by environmental variations. Phenotypic dominance values were estimated, from records of numbers of borers per stalk, for an F_1 and two back cross generations. The F_1 values indicated partial dominance, but both back cross results corresponded to overdominance of fewer borers per stalk.

Comparative studies of the resistance of varieties in Guatemala and the USA to *Helminthosporium turcicum* have indicated differences between the virulence of the pathogen in the two areas.

Varietal tests for resistance to *Diabrotica* species have continued, using Guatemalan and USA specimens.

Varietal tests for tolerance of temperatures as low as -4°C . are being made.

Data were obtained on the recurrent selection system of changing the frequency of genes conditioning yield, using Stiff Stalk Synthetic as the parent stock. Individual S_0 plants were self-pollinated and outcrossed to Iowa 13 as the tester parent. Test cross yields were determined and on the basis of such crosses 10% of the original population was retained; the selfed seed of this 10% was grown in ear-to-row progenies and intercrossed. This crossed seed was then bulked to form the basis of a new cycle of selfing and evaluation of performance in test crosses. In the first cycle, the mean of the population was shifted by 7.5 bushels per acre. This system of breeding is being continued to determine how long progress can be maintained. Similar systems of recurrent selection have also effectively increased oil and tryptophane percentages.

Results obtained on the effect of varying duration of inbreeding on combining ability have shown that yields between S_1 lines were as high as those between the same lines after five generations of inbreeding and selection. These results suggest that modification of standard inbreeding and selection systems may be desirable.

Studies on the inheritance of oil, protein and starch were continued. In connexion with inheritance of oil, it was found that recurrent selection methods were more efficient than the standard systems of inbreeding and selection.

The reaction of three inbred lines to spraying with various 2,4-dichlorophenoxyacetic salts showed that seed set was severely reduced in W 22, but unaffected in WF 9.

Barley

Varietal trials showed that Moore, with a low lodging percentage, was superior in yield to the nine other commonly grown varieties.

Natural selection experiments initiated in 1947 were continued in the F_3 generation, and seed of the F_4 generation is to be grown. The yielding ability of five generations grown in bulk is to be contrasted with artificially selected crops from the same seed.

The reaction of thirty varieties to isolate P-76 of *Pythium graminicola* was measured by obtaining data on average top length, root length and root weight of seedlings; root length and weight appear to give the most reliable index of resistance and susceptibility. Trebi, Montcalm, Kindred, Pillsbury and Mars were the most resistant according to these two measurements.

Forage grasses

Varietal yield tests of *Bromus inermis* continued, using open-pollinated progenies of selections from the varieties Lincoln, Fischer, Achenbach and Jeanerette. In studies of the yielding ability of the clone, compared with selfed or polycrossed progenies, it appears that although the yielding ability of the clone can be predicted by correlation with seed progenies, the accuracy of such predictions diminishes in each successive generation. It is suggested that an inability to determine the exact area occupied, owing to variations in rhizome development, may be responsible.

Replicated trials of clones, top crosses and single crosses of *Dactylis glomerata* continued, with observations on winter hardiness in connexion with soil conservation schemes. The effects of cytological irregularity, measured by the percentage of quartets with micronuclei, on breeding behaviour and morphology were determined.

Leguminous forage crops

Tests using lucerne clones have been directed towards relating self and cross fertility with combining ability. Other data have shown that a polycross progeny test will predict the combining ability of individual selected plants.

By using three-way crosses, selections with a combination of low crown, good seed-setting ability, high forage yield and wilt resistance are being obtained.

Five new strains producing higher yields than present widely grown varieties are to be increased for release.

Replicated trials of polycrossed seed of selected broad-leaved *Lotus corniculatus* clones indicated that certain strains possess inadequate winter hardiness and are of little use for soil conservation.

Varietal trials of red clover have continued. The importance of using adapted varieties in certain localities was emphasized. Selection for resistance to disease continues.

Varietal trials of white clover continued, with selections for resistance to hot, dry summers and severe winter conditions.

Improvements in Madrid sweet clover have been made by selection and inbreeding.

Selections from the F_3 generation of crosses of sweet clover for late flowering lines and resistance to *Ascochyta* sp. have been carried forward to the F_4 generation, in which they will be tested for combining ability in a polycross test.

Over 200 crosses have been made to obtain an analysis of genetic systems governing self incompatibility in *Melilotus officinalis*.

Results have been obtained from an extensive study of meiotic behaviour of interspecific hybridization and inheritance of contrasted characters in the species *M. alba*, *M. suaveolens* and *M. polonica*.

Further results from the F_2 generations of experiments started in 1948 indicate that selection of highly fertile autotetraploid plants, for the improvement of sweet clover and other leguminous crops, is possible.

Potato

A technique has been developed for testing seedlings of new hybrids for resistance to tuber and soil inhabiting pathogens. Tests made with various inbred and hybrid lines have indicated differences in resistance to *Phytophthora infestans*.

Breeding for resistance to scab disease, blight and virus disease has continued. Selections for one valuable characteristic have been crossed and many numbered seedlings have been chosen for further trial.

Varieties with high yields include Kennebec, which is late maturing, and B 61-3, which is an earlier variety resistant to both blight and scab.

Sweet potato

A new variety Shoe Sport, a selection from Shoemaker, has produced superior yields in varietal trials, and resembles Maryland Golden in quality.

Flax

Koto and a new variety Victory are recommended as a result of yield tests.

Sugar beet

Selection for resistance to *Aphanomyces cochlioides* produced eight lines of large, well shaped roots for seed production.

Apple

Two selections for foliage scab resistance have been obtained.

A comparison of old and new varieties has shown that Sharon, Secor, Edgewood, Joan and Hawkeye Greening are desirable for various qualities. Of these, Hawkeye Greening is hardy and produces regularly and heavily on a wide range of soils.

Pear

Breeding for hardiness has continued.

Plum

High quality fruit has been obtained in the cross (Waneta x Moorpark) x Japex. Several hardy selections are being crossed.

Peach

The varieties Halehaven, Gage, Elberta, Polly and Sungold have proved resistant to cold winters since 1940 and have produced high yields of good quality fruit.

Black raspberry

Breeding for resistance to anthracnose has continued, using mainly the varieties Quillen and Black Pearl. Six numbered seedlings showing resistance, hardiness and good fruiting characters have been obtained and are being tested on various soils before naming.

Strawberry

Trials comparing established varieties with new ones from many sources have begun.

Onion

Field trials of F_1 hybrids and varieties were carried out to discover whether hybrid vigour resulted in escape from seedling infection with smut. Attempts are being made to achieve resistance by hybrid vigour. Beltsville Bunching was the only resistant variety discovered; certain hybrids and varieties escaped infection to a limited extent.

Hybrid onions, adapted to peat soils, are being developed by inbreeding lines with good combining qualities and by increasing suitable male sterile lines for use as seed parents.

Yield tests have shown that the highest yielding varieties are not suitable for long storage. Iowa Yellow Globe 44, released for its keeping quality, shows no appreciable increase in yield over Brigham or Southport Yellow Globe.

Melon

Evidence has been obtained that the *Fusarium* sp. responsible for water melon wilt has several races. A very sweet, small melon resulting from a cross of Wondermelon, Jugoslav 7 and Iowa Belle has given high yields in trials of wilt resistant varieties.

Varietal trials of new and established commercial varieties of cantaloupe have shown that the widely grown variety Hales Best 936 continues to compare favourably with others in respect to yield and time of maturity. Hales Best Seed Breeders is an earlier variety with a lower yield; Schoon's Hard Shell is higher yielding but has a tendency to split.

Pumpkin

Varietal differences in suitability for canning were recorded. No correlation was noted between colour and consistency. The type and quality of canning pumpkins are being improved by breeding.

Tomato

The discovery of the presence of *Phytophthora infestans* on native Guatemalan tomato plants throughout the year has indicated an alternative host, in addition to the potato, for the overwintering period.

Suggestions that the tomato may have been the original host have been put forward. Non-segregating populations of six inbred lines of tomato were used in an attempt to elucidate the problem of genetic analysis of quantitative characters. The yield was considered in the form of simpler component parts, for each of which the controlling genes were estimated. Genotypic relationships were established among the components, and represented diagrammatically. A discriminant function was calculated for the selection of the maximum genotypic gain for yield.

F₁ hybrids of many of the commonly grown varieties were produced to investigate the possibilities of increasing yields. Higher early yields were obtained from those having Earliana as one parent, and several others produced higher late yields.

Continued selections from succeeding generations of several interspecific crosses have been made in attempts to produce resistance to *Septoria* and *Alternaria*.

Soya bean

Homozygous strains and varieties have been grown in replicated plots for selection of parents for further hybridization. The variety Adams, selected from the cross Illini x Dunfield has higher yields than Lincoln, and was released in 1949 (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1425). Another new high yielding strain, adapted to northern Iowa, competes favourably with standard varieties and is being increased for release.

Improvements in yield, seed size, palatability and height are being sought by crossing standard vegetable soya beans with field varieties.

The effects of induced polyploidy are being investigated.

Isolates of *Diaporthe Phaseolorum* var. *Batatatis* and *D. Phaseolorum* var. *Sojae* are being tested for pathogenicity on four varieties of soya bean.

Sweet corn

Selection from stocks showing a low frequency of haploids has increased their incidence from 1 : 542 to 1 : 249.

Breeding has continued to produce plants with silks which remain light coloured after processing.

Light coloured processed silk has so far been found to be recessive to dark, but the character of silk colour when processed may be dependent upon more than one gene pair since intermediate shades occur. Three lines have been released; a combination of two of these, 5125 x 453, has been named Iochief.

Tests carried out to determine the resistance of certain inbred lines and hybrids to spraying with 2,4-dichlorophenoxyacetic amines and esters showed that hybrid yields are less affected. This may be a result of heterosis. Yields of hybrids were varyingly affected.

Popcorn

Work on hybrid production is described. Yield tests showed that Iowa 3251 is an outstanding hybrid, to be released in 1950.

893.

**Sixtieth Annual Report of the Agricultural Experiment Station,
University of Arizona, Tucson, for the year ending June 30, 1949
(1950) : Pp. 69.**

Varietal tests of the following crops are reported: castor bean, sesame, safflower, barley, oats, sorghum, orange and pecan.

Wheat

The 23 strong strawed selections mentioned in the previous annual report (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 677) were tested for standing ability and four which stood well and gave yields equal to or above that of Baart 38 were selected for further increase and testing. From two of these progenies, 329 head selections were made in order to test their uniformity and to determine whether still stronger and higher yielding types could be isolated from them.

Lucerne

On the basis of seed production and hay quality, ten progenies of African and 38 of Indian lucerne were selected for further increase and testing.

Variety tests at various locations are reported. All non-hardy southern types being tested for wilt resistance failed to survive inoculations with the pathogen *Corynebacterium insidiosum*. Root diseases in Arizona appear to be associated with a complex of pathogens. Certain lucernes known to be wilt resistant are now under test.

Guar

Tests of selected and newly imported strains are reported.

Cotton

Tests showed that Acala cottons are better adapted than Paula varieties for late mechanical harvesting.

Progenies of new Acala varieties were selected on the basis of yield. Varietal yields, spinning properties and fibre properties are tabulated.

Progress is reported in breeding for tolerance of *Verticillium* wilt.

Progenies of multiple crosses of long staple cotton were selected for lint yield and boll size. In an attempt to establish a long staple variety with reduced plant height, 55 progenies of a low plant selection were tested and gave satisfactory yield, boll size and lint strength. A number of low plant selections have lint $1\frac{3}{8}$ inches long and very strong.

Flax

Results of tests of varieties and strains for wilt resistance are given. Selections were made for resistance, vigour and high yield in the variety De Anza No. 6 and the cross Calar x C.I. 1040.

Lettuce

Various recently released varieties and new strains are being tested. The main objective of the present lettuce breeding programme in Arizona is to develop improved varieties for the different regional and seasonal conditions.

This is being accomplished through hybridization, pedigree selection within adapted varieties and the utilization of introductions or new varieties.

Melon

Varities and strains were tested and some breeding material was included for selfing and crossing. Outstanding cantaloupe strains are enumerated. Several promising varieties and strains of honeydew melons and water melons were selected.

Tomato

Three varieties are compared as regards susceptibility to curly top.

894.

Soil, water and crop management investigations in the Columbia Basin Project.

Bull. U.S. Dep. Agric. 1950 : No. 520 : Pp. 75.

Investigations of the fertilizer and spacing requirements in the newly irrigated area, with tests for varieties well adapted to the long growing season and the hard winter conditions have been carried out with such crops as maize, small grains, sorghum, seed flax, sugar beet, potato, various fruits and vegetables, Lima bean, soya bean and sweet corn. Plant disease research has begun.

895.

Administration Report of the Director of Agriculture, British Guiana for the year 1948 (1950) : Pp. 20.

Rice

Work at the Rice Experimental Station, Georgetown, included trials of new hybrids. The best of the 1942 series of hybrids are 54/42, 85/42 and 95/42. These varieties have out-yielded the standard commercial varieties and produce grain with attractive appearance and good quality. They are to be planted more extensively, for study of their field performance and for full scale milling tests. The recently released variety D52/37 has met with popularity among growers.

Sugar

No breeding work was undertaken in 1948 as arrangements had been made to obtain material from the British West Indies Central Cane Breeding Station, Barbados. Selection and testing of the 1945 and 1946 series of seedlings proceeded along routine lines. Thirty seven variety trials were reaped during the year under review. The results suggest that a large scale replacement of the present commercial standard canes by varieties greatly exceeding them in yield is unlikely in the near future; probably the new canes will only be slightly superior in yielding capacity but will have definite superiority in juice quality, ease of cutting and loading, and other characters. As a result of the 1948 variety trials, seedlings B 41227 and D 142/41 have been distributed to estates for small scale commercial trial. Distribution of B 37161, released in 1947, continued. Among the promising varieties at present under test are B 37172, B 4098, B 41211 and D 158/41.

896.

Administration Report of the Director of Agriculture, British Guiana for the year 1949 : C.S.O. No. 2/4 : Pp. 19.

Rice

At the Rice Experimental Station, Georgetown, the three new varieties D 54-42, D 85-42 and D 95-42 were tested on a field scale for the first time. They have given consistently good yields over a five year period and appear to be adapted to mechanical reaping.

Sugar

The results of 45 variety experiments harvested in 1949 suggest that the present standard canes B 34104, D 14/34 and Co.421 are not as satisfactory as some of the varieties now under test. Of the newer canes, B 41227 shows particular promise and its planting on a commercial scale is expected in 1950. Other promising varieties are B 4098, B 40105 and D 158/41.

897.

SCHWEIZER, J.,
SCHOONNEVELDT, J. C. van, and
VOLLEMA, J. S.

Beknopt jaarverslag van het C.P.V.-* proefstation over 1949. (**Condensed annual report of the CPV experiment station for 1949**).
Bergcultures 1950 : 19 : 341-48, 359-67.

Insecticides

Mundulea suberosa is suitable as a shade tree for cacao near Bogor and preliminary experiments with cuttings and buddings were carried out in view of possible variations in insecticide content of the bark, which contains around 1% rotenone.

Tobacco

Local strains were crossed with a variety from South Africa resistant to *Phytophthora*. The mosaic resistant *Nicotiana glutinosa*, received from France, has completely succumbed to slime sickness (*Phytophthora*) and is not a desirable parent. Seedlings from pollen irradiated with X-rays show clear abnormalities and are being observed, as are germinated seeds treated with colchicine.

Tea

Clones show much greater fluctuations in yield than seedlings. New clonal test gardens have been established and self pollination was carried out on 58 clones to determine which are self fertile.

Cacao

The method of propagating by cuttings has succeeded and various clones are being tested. Females of *Forcipomyia* sp. are responsible for natural pollination. Further crosses of DR 1, DR 38 and Gt 8 are being made by hand pollination.

* Centrale Proefstations Vereniging.

Cinchona

The uncertain future has caused research to be reduced to carrying on existing experiments and collecting the important selection material in the Tjibeureum experiment garden. Yields are being recorded from Tjiwangi clones KP 413-435. Eleven mother trees have been selected for further testing from the seedling family Tjib 5 x GA 22.

Rubber

Clonal seed from PR 107 yields only moderately well. The best parents are Tjir 1, PR 107, Djas 1, War 1 and BR 2. The most promising 99 out of 3171 clones derived from the highest yielding legitimate seedlings are being tested.

Mimosa invisa

Seed of a thornless variety was planted out and produced thornless individuals.

898.

Twenty-fourth Annual Report of the Department of Scientific and Industrial Research, New Zealand 1950 : Pp. 112.

Wheat

The wheat breeding section of the Wheat Research Institute has been amalgamated with the former Agronomy Division, the laboratories at Christchurch retaining the name Wheat Research Institute.

Extensive trials of 11 new varieties, developed from crosses involving Cross 7, Tainui Dreadnought, Holdfast and some unnamed hybrids, were conducted. In most of the trials all the varieties considerably outyielded the standard Cross 7; in baking quality they are similar to this variety. Data on the commercial performance of the recently released wheat Hilgendorf (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1513) suggest that this variety is not as thoroughly reliable under all conditions as Cross 7. A number of lines selected from the material which gave rise to Hilgendorf have been tested. One of these, 140,014/4, has so far yielded consistently and substantially more than Hilgendorf; in the majority of the last season's trials it outyielded Cross 7; in baking quality the line is superior to Cross 7 though possibly not quite as good as Hilgendorf. Further trials of this new wheat are being carried out. In addition, lines from crosses between Hilgendorf and Cross 7 are under test in the hope of developing a high quality wheat. This material is also being used for the purpose of ascertaining whether selection for protein content under New Zealand conditions is effective in breeding for improved baking quality.

Breeding for mildew (*Erysiphe graminis*) resistance has been initiated; it is hoped that a mildew resistant type of Cross 7 will be available in a few years' time.

Studies on the inheritance of quantitative characters and on the effects of various methods of selection continued.

Oats

The short stiff-strawed variety S 172 introduced from the Welsh Plant Breeding Station is being used in breeding for lodging resistance. Breeding for resistance to rusts has been intensified.

Barley

Reselection of Research and selection of hybrids from crosses between Scandinavian and English barleys continued.

Grasses and legumes

In the genus *Agropyron* a number of true breeding self fertile forms have been distinguished. An artificial hybrid between one of these forms and *A. Kirkee* has been secured.

Pasture trials are being continued to compare the performance of pedigree strains with that of the best New Zealand and introduced strains.

New pasture, hay and dual purpose strains of cocksfoot, bred at the Palmerston North Station, have yielded about 15% more fodder than the Government stock strain over a four year period at the Lincoln Substation.

To provide information on aspects of breeding techniques with cross-pollinated plants, a comparison has been made between various systems of progeny testing with *Lolium*; the

value of progeny testing by open pollination in an "increase area" as a method of testing the combining ability of selected plants was indicated.

Work is in progress to improve still further the performance of New Zealand certified lucerne, bred by the Agronomy Division and tested under the name Strain B. Crosses have been made between New Zealand certified lucerne and *Medicago glutinosa* in an attempt to combine the high forage and seed yields of the former with the capacity of the latter to withstand hard grazing. New creeping lucernes from Canada are under test.

A non-shattering selection of sweet yellow lupin with white seed is being increased. Sweet white flowered lupin has been crossed with the bitter pink lupin to incorporate in the former the early vigour and soft seed coat of the latter. Variability in New Zealand of introduced lines of *Lotus uliginosus* and *L. corniculatus* is being studied. Information on the breeding mechanisms of these two species and of strawberry clover is being sought as a guide to future breeding.

Rape

Hybrid material from the cross between a club root resistant strain and Broad Leaf Essex is being selected to obtain a club root resistant rape with earlier maturity and higher yielding ability. From a cross between club root resistant rape and aphid resistant swede, two out of 78 plants survived a heavy aphid attack; these will be used in breeding a rape resistant to both club root and aphid.

Swede

The cross Calder x Danish Giant shows promising yielding capacity and tolerance of dry conditions. The mechanism of field resistance to aphids possessed by Calder and Sensation is under investigation; aphids reproduce more slowly on resistant varieties; these, however, succumb if the initial infection is abnormally heavy.

Kale

The hybrid between giant chou moellier and thousand-headed kale has shown good performance, producing a higher leaf yield than either parent and a stem yield comparable with that of giant chou moellier. A population obtained by crossing leafy chou moelliers gave a high leaf yield and good total yield.

Potato

The development of varieties resistant to late blight and virus is receiving attention.

Flax and linseed

Several varieties of flax and linseed have exhibited resistance to rust. Identification of rust races continued.

A rust immune strain of the flax Liral Crown is to be developed from crosses that have been made between the present susceptible strain and immune selections of Russian and Argentine varieties.

The varieties Golden Viking, Cheyenne and Rio are being used in a triple cross with the aim of breeding a linseed with early maturity, high yielding ability and resistance to rust, browning, wilt and pasmo, and the capacity to withstand bad harvest conditions.

Phormium

Breeding is receiving attention.

Tobacco

Progress in breeding for resistance to black root rot is reported. In breeding for mosaic resistance, some lines have proved to be highly resistant but are still not of the desired flue cured type; further back-crossing to the flue cured parents has been effected. Breeding for resistance to *Verticillium* wilt has begun. In variety trials, Harrison's Special 215 maintained its place as a tobacco combining high yielding capacity and good quality. In a trial of burley varieties on soil infected with black root rot, Ky 33 and Ky 34 from Kentucky and Haronova and Harmony from Canada proved to be highly resistant in comparison with the susceptible local variety; these tobaccos also yielded well on non-infected soil.

Hops

New hybrid hops are under investigation at the Hop Research Station. Lines of two varieties showing considerable resistance to root rot are being propagated. New varieties

from Wye College, England, and Tasmania are at present in quarantine. At the Cawthron Institute, Fuggle has proved to be resistant to *Phytophthora* in artificial inoculation tests.

Vegetables

Selections from promising lines of savoy cabbage, spring cabbage, broccoli, summer cabbage and Holmes Improved carrot, showing marked improvements in uniformity and type, have been obtained; the first of these are now ready for increase and distribution.

Work on the production of hybrid onion seed has begun. So far this has been concerned mainly with the introduction of the character of male sterility into the variety Pukekohe. Tomato hybridization is in progress. The resistance of Improved Bay State to leaf mould has been confirmed. The yield and quality of this variety have equalled or exceeded that of standard greenhouse varieties.

Dwarf bean breeding has been initiated to obtain an early maturing variety resistant to yellows.

A new Greenfeast type of pea resistant to pea mosaic is to undergo field trial. Breeding for resistance to *Fusarium orthoceras* is in progress, using resistant varieties from the USA in crosses with New Zealand garden and field peas. Work is being continued on the production of (1) a pea as early as William Massey but with better yield; (2) a higher yielding, earlier pea of the Blue Prussian type; and (3) a variety of the Partridge type with early, smooth seed and uniform maturity. In the third project promising selections have been secured from a cross between Partridge and Black-eyed Susan.

Hybrid sweet corn seed has been produced from inbred lines received from the USA.

899.

Kimberley Research Station progress report, 1947-49.

J. Agric. W. Aust. 1950 : 27 : 199-209.

Sorghum

Superior yields have been obtained from the varieties Caprock, Kalo, Wheatland and Hegari in varietal trials under irrigation.

Rice

Trials of varieties from the Murrumbidgee irrigation area have shown that they mature too early to make full use of the growing season under irrigation in the tropics. Several varieties have been introduced from New Guinea and Brazil.

Cotton

The variety Locket 140 has given promising yields of fair to good quality cotton in tests directed towards obtaining varieties which will mature earlier under dry season irrigation conditions. Varieties introduced from South America and Egypt are under observation.

Groundnut

Varietal differences in susceptibility to grasshoppers have been observed.

Cowpea

Variety Reeve Q33 has proved promising.

900.

Report of the Minister of Agriculture, South Australia, for the year ended 30th June, 1948 (1949) : Pp. 44.

The selection and development of strains of pasture plant species have been recommenced. Varietal tests of wheat, oats and flax are reported.

901.

Report of the Minister of Agriculture, South Australia, for the year ended 30th June, 1949 (1950) : Pp. 48.

Progress is reported with the trial of new species and the selection and development of strains of grasses. Replicated trials of wheat varieties for yield and grain quality were started. Varietal tests of oats and flax are also reported. Apricot gummosis caused by

Cytosporina spp. is being investigated in the variety orchard where seven varieties have been inoculated. Sixty-two vine varieties have been planted out and more are to be added to the collection as they become available.

902. SMITH, H. C.

Annual Report of the Department of Agriculture, Tasmania, for the year 1948-49 (1949) : No. 40 : Pp. 36.

Wheat

Hybrid selections giving higher yields than the control variety Major in replicated single row plots have been retained for trial on a larger scale. Australian rust resistant varieties were tested; of these, Celebration outyielded Ghurka and showed almost complete immunity from stem rust under epidemic conditions; this variety will be used in hybridization. Grain samples of new hybrids of the biscuit type were tested for quality. New crosses were effected at the Cressy Research Farm.

Oats

The technique of hybridization was studied.

Barley

At Cressy the Danish varieties Kenia and Maja gave a particularly good performance, exceeding the yield of the standard Plumage Archer by 45% and 41% respectively.

Grasses and legumes

A selected line of cocksfoot is being tested against local and introduced strains in the Cressy and other districts. Crested wheat grass and subterranean clover strains are to be subjected to extensive trial.

Linseed

The majority of varieties and hybrids studied at Cressy outyielded Walsh, the variety grown commercially in Tasmania.

Strawberry

In the New Town experimental area crosses were made in which Royal Sovereign, Tardive and Ettersburg Tree formed the female parents and varieties from the United States the male parents.

Tomato

Selection of hybrid material continued.

903. TOLMAČEV, I. A.

(Ivan Vladimirovič Mičurin).

Sovetskaja Agronomija (Soviet Agronomy) 1950 : No. 6 : 6-16.

In the article, written on the occasion of the fifteenth anniversary, of the death of Mičurin, some of the breeding methods employed by the Soviet plant breeder are discussed. More recent results obtained by vegetative hybridization include new tomato varieties developed by Gluščenko, melons adapted to the Moscow climatic conditions bred by Ušakova and the control of albinism in lemons obtained by Mamporiĭ by grafting albino scions on green stocks. In grafting experiments with wheats, the hard wheat character was transmitted to soft wheat scions from hard wheat stocks and the spring habit to winter wheats from spring stocks.

904.

Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources, Lake Success 17 August—6 September 1949 : 1 : Pp. 431.

The proceedings of the above conference are being issued in eight volumes, of which the first has been received: I. Plenary Meetings; II. Mineral Resources; III. Fuel and Energy Resources; IV. Water Resources; V. Forest Resources; VI. Land Resources;

VII. Wild life and Fish Resources; VIII. Index. Volume VI will include the proceedings of the meeting on plant breeding.

905.

Second Report of the Agricultural Improvement Council for England and Wales. Lond. 1950 : Pp. 26.

Mention is made of the following activities of the council: plans to establish a series of experimental horticultural stations to function in cooperation with the existing horticultural research institutes and the new Vegetable Research Station in Warwickshire (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 581); the establishment of the new Grassland Research Station at Hurley, Berkshire; the setting up of a joint committee with the National Institute of Agricultural Botany to consider problems of seed testing, multiplication and distribution; enquiry into the failure of field beans, a problem whose solution may be aided by breeding more suitable strains; an examination of the possibilities of breeding strains of *Brassica* crops resistant to club root; consideration of the various causes of seed contamination; and the sponsoring of field trials to test German and New Zealand strains of sweet lupin for fodder and the possibility of growing tobacco for nicotine.

906.

Work of the technical divisions.

Work of FAO 1949/50, Washington 1950 : 22-38.

Progress is reported in the projects dealing with rice breeding in the Far East (cf. Abst. 1050), hybrid maize testing and breeding in Europe and the Near East (cf. Abst. 1016), the world catalogues of genetic stocks of wheat (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2248) and rice (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2351), world list of plant breeders (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 685) and the widespread seed distribution for experimental testing.

907.

ŠKOLJNIK, M. JA.

(Supplying plants with minerals is an important factor in bringing about directed changes).

Priroda (Nature) 1948 : No. 8 : 38-46.

Sixty-seven papers dealing with the effect of macroelements and microelements upon plant yield and resistance to diseases are reviewed. It is considered that for the training of plants with mineral dressings to acquire resistance to drought and soil salinity or to produce higher contents of definite chemical substances, plant material with shattered or otherwise unstable inheritance, such as distant hybrids, should be used.

908.

HUYSMA'S, C. P.

Ziekteresistentie. (Disease resistance).

Landbouwk. Tijdschr., Wageningen 1950 : 62 : 669-72.

Problems connected with the nature of disease resistance in plants are discussed, e.g. the genetical basis of resistance, and the fact that in general wild plants suffer less than cultivated. Resistance is of two main types: apparent, or real avoidance of infection, and true resistance, i.e. resistance to infection or further development of the disease organism; different manifestations of true resistance are analysed.

909.

Mécanisme de la résistance des plantes aux maladies. (Mechanism of the resistance of plants to diseases).

Rev. Hort., Paris 1948 : 120 : 375-76.

Published work in English, Hungarian and Russian has provided the material for this short note on some biochemical processes thought to determine disease resistance in the root cells of plants.

910. EDLUND, Å.
Porsögården—växtförädlingens utpost i norr. (**Porsö farm, an out-
post of plant breeding in the north**).
Lantmannen 1950 : 34 : 690-92.

The Porsö experimental farm, purchased by the Agricultural Society of Norrbotten, Sweden, in 1937 for plant breeding research with special reference to the needs of Norrbotten with its severe northern climate, is described. Varieties for the cereal trials have been obtained largely from Sweden and Finland, but in addition unspecified Canadian and Russian material is being tested. Peas, potatoes and pasture plants are also included in the research programme and turnips and sugar beet are grown for seed though not yet undergoing trials. The possibility of growing various oil crops and soya beans may be considered in the future.

In hybridization of potatoes, grafting on tomato plants is used to overcome male sterility.

911. **Forty-second Annual Report of the Norfolk Agricultural Station
1949-50 (1951) : Pp. 12.**

Wheat

A comprehensive survey of varietal susceptibility to eye spot, *Cercospora herpotrichoides*, was possible during the severe attack in the 1950 season.

Capelle Desprez has proved to be a late maturing French variety with greater disease resistance than Nord Desprez. The varieties Eroica and Scandia II have shown most promise among the Scandinavian types, the former being particularly suitable as a combine wheat.

Quality trials of wheats have shown that the variety King III, contrary to earlier reports, is too soft for milling. Yga, a hard French variety, has been found most desirable for bread making.

Oats

The variety Sun II outyielded Eagle in the spring oat trials.

Barley

In varietal trials of a number of spring barleys bred by the Cambridge Plant Breeding Institute, the cross Kenia x Plumage Archer has shown exceptional promise, especially in improved malting quality over the variety Kenia, ripening almost as early.

A comparison of the yields of Spratt Archer and Kenia varieties in the 1950 season, at three levels of nitrogenous manuring, showed that Kenia gave superior yields and that lodging was much less and occurred later, at all three levels, in this variety.

Fodder beet

Five promising strains are being studied; these include two mangold strains, New Century and Red Intermediate, and the fodder beets Barres Øtofte and Hunsballe. The latter has shown a minimum of rot among varieties undergoing storage trials.

Flax

Varietal trials are in progress at Ashmanhaugh.

Sugar beet

Varietal trials have continued.

Linseed

After a three year varietal trial, the Swedish Valuta has shown the greatest promise, outyielding Royal by an average of 18%. The American Dakota, which is an early variety, may replace Redwing.

Green vegetables

Several varieties of broccoli and Brussels sprouts are undergoing further trials.

912. HÖPPNER, H.
Grundsätzliches über Sortenprüfung und Zulassung. (Basic principles relating to the testing and certification of varieties).
Arch. Dtsch. Landw.-Ges. 1950 : 5 : 15-21.

The reorganization and future development of variety testing in Germany are described in broad outlines.

913.
Hong Kong Report of the Agricultural Department for the period 1st April, 1948 to 31st March, 1949 : Pp. 49.

The results of varietal tests of rice, groundnut and various vegetable crops are given. Banana, papaya and guava varieties have been planted out for observation.

914.
Report of the Scientific Department for the Crop Year 1948-49.
Overseas Food Corporation. Report and Accounts for 1949-50 : 77-102.

The results of varietal trials of groundnuts, sunflower, sorghum, maize, safflower and soya bean during the season 1948-49 in Kongwa, Urambo and Southern Province regions of Tanganyika are summarized.

915. PATTERSON, R. E.
A method of adjustment for calculating comparable yields in variety tests.
Agron. J. 1950 : 24 : 509-11.

A method of adjustment, based upon the principles of the analysis of variance, is outlined by means of which comparable yields in variety tests can be calculated and the problem of comparing varieties irrespective of the years in which they were grown can be overcome. The method has the following advantages over the normal methods of calculating comparable yields: ease of calculation; differences between varieties grown during the same period are not changed by the adjustments; the varietal variance is only slightly affected by the adjustments and an accurate estimate of this variance is possible; and the variety-year interaction in the actual data is not altered. No attempt to estimate the yield of a variety in a year in which it was not grown has been made. Use of the method is illustrated by data from cotton variety tests conducted at the Texas Agricultural Experiment Station.

916.
Progress Report of the Dominion Experimental Substation Fort Vermilion Alberta 1939-1948.
Dep. Agric. Canada : Pp. 40.

Varietal tests of wheat, oats, barley, forage grasses and legumes, flax, sunflower and field maize for silage, tree fruits, small fruits, root crops, vegetables and soya bean have been carried out.

917. ROSE, M. F.
Possible crops for the cotton rotation in the Southern Jebels area of Kordofan, A.E. Sudan.
Emp. Cott. Gr. Rev. 1950 : 27 : 261-74.

In order to organize a rotation system of food, cash and restorative crops in these areas selective testing has been carried out with the following crops: *Sorghum vulgare*, *Zea Mays*,

Pennisetum typhoideum, *Sesamum orientale*, *Arachis hypogaea*, *Helianthus annuus*, *Glycine Max*, *Phaseolus acutifolius*, various harig grasses, *Vigna unguiculata* and *Cajanus Cajan*. The value of the cowpea *V. unguiculata* as a restorative legume has been recognized, and seeds of the varieties Kadugli 3 and 47 are being produced commercially.

CEREALS

918. KEEGAN, R. and
HUNTLEY, D. N.
Oats and barley in Ontario.
Bull. Ont. Agric. Coll. 1948 : No. 454 : Pp. 18.

A brief account of oats and barley breeding is included; descriptions are given of varieties recommended for growing in Ontario.

919. DRAHORAD, F.
Probleme des Getreidebaues und der Getreidezuchtung. (**Problems of cereal cultivation and cereal breeding**).
Bodenkultur, Wien. 1950 : 1. Sonderheft : 49-54.

This paper, dealing with plant cultivation and plant breeding in Austria, stresses the importance of producing and using varieties and races of cultivated plants that are adapted to the region where they are to be grown; the importance of indigenous varieties is emphasized. The measures that are being taken to improve the quality and yields of crop plants are outlined as well as the role of plant breeding stations in this work.

The author mentions the formation of the Lungauer Saatzucht- und Saatbauvereinigung [Lungau Association for Seed Breeding and Seed Cultivation] at Salzburg, an association founded by him and especially concerned with the improvement of grain cultivation in mountain land and the production of grain for the inhabitants of such land. This association has produced Lungauer Tauern rye, the first alpine winter rye entered in the Austrian Breeding Register and noted for its suitability for exposed mountain regions. Present aims in breeding are: (1) new winter hardy wheat varieties resistant to drought, lodging and rust and especially suited to comply with the prerequisites for quality in Pannonia; (2) extension of breeding work on winter barley for maximum production of economic fodder for dry localities; and (3) the breeding from land varieties of new maize varieties which will be suited to special districts and therefore yield satisfactory silage, fodder and grain, especially in the dry eastern parts of Austria. Three varieties of wheat and three of maize bred by the author are, so far satisfactorily, undergoing tests for registration in the Austrian Breeding Register.

920. KOBLET, R.
Bericht über die Tätigkeit der Eidg. Landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon pro 1948/49. (**Report on the work of the Federal Agricultural Research Institute, Zürich-Oerlikon for 1948/49**).
Landw. Jb. Schweiz 1950 : 64 : 373-444.

Wheat

Strains of winter wheat selected in 1948 are still being tested. The collection of winter wheats has been enlarged, especially with indigenous land varieties. Varieties showing good development of the grain are being crossed with the variety Probus and with *Septoria* resistant wheats. Work continues on a smaller scale to test the suitability of some varieties, from large scale tests in 1945-48, for mountainous and dry districts. None has surpassed MC 245 or Probus.

Varieties of spring wheat were tested in five districts. Huron still proved superior in yields of grain and straw to all other varieties tested in all districts, but in the Rhine valley Pilot and Newthatch were less susceptible than Huron to leaf blight and gave better yields there. The French wheats Gerbor, Hybride de Bersée, Gironde and D. D. Tourneur, which combine winter hardiness with a high tendency to shooting in the long day, shot

later than other varieties, i.e., the winter wheat character was manifested to some extent. In the second year of a variety trial of spelt in five places in German Switzerland, four strains surpassed the standard variety Oberkulm 3 in grain yield.

Rye

Petkus rye has been crossed with Rothenbrunner with the object of obtaining a Swiss variety suitable to the special conditions in mountain and moor lands; it is unlikely that the yield will equal that of Petkus. New strains of Fellers gave good yields. The hybrid Petkus x Fellers tested at Nante, survived the winter well and showed a remarkably high 1000 corn weight; the glume closure was only slightly improved. Back crossing is now being carried out.

Maize

The hybrid maizes were classified in groups according to the ripening time. Cultivation trials were carried out in various districts with hybrid maize. At Tessin the hybrid varieties from the groups 105-115 days equalled Nostrano dell' Isola as regards early ripening. Only hybrids in the 80-85 day groups are being tested in the Rhine valley; none has surpassed the local maize variety, but they have proved remarkable in their high resistance to lodging and to *Puccinia Sorghi*.

921. PFEIFFER, R.

Aktuelle Fragen der Getreidezüchtung. (**Questions of the day relating to cereal breeding**).

Veröff. Bundesanst. alp. Landw. Admont 1950 : No. 3 : 99-115.

A survey is given of the advances in cereal breeding in the international sphere. The necessity of testing the Russian theories is indicated. The author stresses the need for government research stations in Austria for work on cereal breeding, in which modern methods of breeding should be used. These institutes should also extend the exchange of information on research with other countries. Owing to its large amount of breeding material, the Federal Research Institute for Alpine Agriculture at Admont is eminently suited to take part in this expansion.

922. GÜNTHARDT, H.

Die Abderhalden Reaktion mit pflanzlichen Substraten zur Erkennung von identischen Sorten und Neuzüchtungen. (**The Abderhalden reaction with plant substrates for the recognition of identical varieties and new forms obtained by breeding**).

Z. Pflanzenz. 1950 : 29 : 209-21.

A detailed account is given of the technique of the Abderhalden reaction and its use in identifying varieties and mutants of various cereals and vegetables by the specific proteins contained in their leaves or seeds.

923.

(**A quicker solution of the problem of changes in the seed certification method**).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 5 : 1-4.

The lively discussion begun on the pages of this journal by Jakubciner (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2461), who proposed Mičurinite changes in seed certification methods, has led the editors to state their own views on the subject, although correspondence is still coming in, including a paper by Bondarev appearing in the current issue (cf. Abst. 924). In the editors' view, changes in the methods conforming with the Mičurinite teaching are imperative. It is suggested that the department of the USSR Ministry of Agriculture dealing with the administration of varietal seed of cereals and oil crops should draw up new guiding principles for seed tests. These should take into account the different Mičurinite points made by various writers after their most important proposals have been tried experimentally.

924. BONDAREV, V. P.

(Biological evaluation of seed material).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 5 : 5-10.

High yield, good quality of the harvested produce and capacity for survival of large percentages of individuals under varied external conditions are the criteria for the biological evaluation of seed suggested by the writer.

925. GERM, H. and
KIETREIBER, M.

Zur Methodik der Triebkraftprüfung von Getreide in Keimrollen. (On the technique of testing germinability of cereals using rolled up seeds).

Bodenkultur, Wien 1950 : 1. Sonderheft : 15-22.

The author's method of germinating seeds by rolling them in filter paper has been developed to produce a method of determining germinability of cereal grains; to do this, it was necessary to set up standards for the different cereals.

Attention is drawn to the marked difference in the type of root growth of spring and winter barleys, which should be of interest to the breeder.

926. NIKITENKO, G. F.

(Intravarietal and intervarietal vegetative hybridization as a means of producing varietally improved élite seed of oats and barley).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 5 : 35-39.

The Mičurinite principles of hybridization and training as recommended by Oljžanskiĭ *et al* (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 228) for commercial seed growing can be applied to the production of élites of oats and barley. However it is considered that inclusion of vegetative hybridization in the scheme would improve the results of the work with these two crops, which lack the capacity of wheat for natural cross pollination.

The scheme as proposed by the writer involves a nursery for intravarietal or intervarietal F_0 grafts, a selection nursery for the F_1 , a seed nursery for the F_2 , a preliminary nursery for multiplication of the F_3 and nurseries for the production of super-élites in the F_4 and of élites in the F_5 .

The grafting technique which has been developed at the Mordva State Breeding Station is described. It consists of grafting an embryo upon two endosperms and deep sowing of the grafted seed to ensure a fuller use by the scion of the nutrients contained in the endosperms. Water at room temperature is applied to the cut surfaces of the grafted material to promote union.

927.

Dr. Christensen completes study of plant disease problems in Japan.

Wkly Summ. Natural Resources Sect. Gen. Hdqrs Allied Powers, Japan 1950 : No. 245 : 5-6. (Mimeographed).

CHRISTENSEN, J. J.

NR press statement on plant disease problems in Japan.

Ibid. 1950 : No. 245 : p. 6. (Mimeographed).

Recommendations concerning the control of crop diseases in Japan, particularly those of wheat and barley, are put forward (cf. Abst. 928), including suggestions for a cooperative programme of developing resistant varieties.

928.

Control of plant diseases with particular reference to wheat and barley.

Wkly Summ. Natural Resources Sect. Gen. Hdqrs Allied Powers, Japan 1950 : No. 246 : 3-11. (Mimeographed).

A study of plant disease problems in Japan, with special reference to wheat and barley, was recently completed by J. J. Christensen, professor of plant pathology at the University of Minnesota. The value of a programme of breeding for resistance is emphasized and some of the problems which would be entailed in such a scheme are discussed.

929.

CHEREWICK, W. J. and
POPP, W.

A modification of Moore's method of inoculating wheat and barley with loose smut.

Phytopathology 1950 : 40 : 1054-56.

A modification of the partial vacuum method of Moore (cf. *Plant Breeding Abstracts*, Vol. VI, Abst. 1199) for inoculating wheat and barley with loose smuts to study physiological races and test varieties and selections for resistance is described. It is estimated that with the modified apparatus two persons can inoculate from 400 to 600 heads per hour.

930.

DEMEL, J. and
GRAF, A.

Getreidesortenversuche. (Cereal variety trials).

Bodenkultur, Wien 1950 : 1. Sonderheft : 54-78.

Variety trials showing the performance of 9 spring wheats, 12 spring barleys and 15 varieties of oats were made at Fuchsenbigl, Grabenegg and Lambach, and in the case of 24 winter wheats at Fuchsenbigl and Grabenegg. Tabulated results show the grain and straw yields and the quality.

931.

Annual Report of the Department of Agriculture, New Zealand, for the year 1949-50 : Pp. 128.

Trials conducted by the Extension Division on cereal, linseed and potato varieties and pasture species are briefly reported. Field testing of wheat, oats and barley hybrids and selections at the Wheat Research Institute by the Crop Research Institute, Department of Scientific and Industrial Research, was continued (cf. Abst. 898). Marked yield increases over local varieties have been obtained in trials of maize hybrids introduced from the United States.

WHEAT

932.

IMHOF, A. H.

New Penn wheat outyields all others in variety trials.

Crops and Soils 1951 : 3 : No. 4 : p. 27.

A new soft red winter wheat variety Penn. 114A-42, as yet unnamed, has given superior yields averaging 33.5 bushels per acre in nine counties of Pennsylvania during 1950. It is being increased for seed.

933.

I nuovi grani dell'Istituto di Agronomia dell'Università di Pisa. (**The new wheats of the Institute of Agronomy of the University of Pisa**).
Agricoltura Tosc. 1950 : 5 : 381-82.

Seed of the following wheats, bred by Avanzi, is now available for multiplication at various centres: Vittorio Niccoli (Inallettibile 3), Girolamo Caruso (Inallettibile 8), Gentil Rosso x

Noé 46 family 9, and Ancona. The last named is also included among eight new varieties and races whose characteristics and suitability for various types of soils are briefly noted. Two selections 1083 and 1089 from the oat Morella are regarded as satisfactory.

934. WAGNER, S.

Aus der pflanzenbaulichen Versuchsarbeit auf dem Versuchsgut Reckenholz. Züchtungsarbeiten bei Getreide. (**Some of the agricultural research on the Reckenholz experimental estate. Work on cereal breeding**).

Schweiz. Landw. Mh. 1950 : 28 : 241-49.

In winter wheat the aim is to produce, by hybridization, sufficiently robust varieties showing high yield and high resistance to lodging and yielding good flour with satisfactory baking properties. In addition to the actual breeding strains, a collection numbering 340 winter wheats, comprising the more important foreign varieties and 40 old Swiss land varieties, is being studied to find suitable partners for crosses. The same principles and methods are being used in breeding a winter form of spelt.

Spring wheat varieties are required which besides high yield and resistance to lodging also show baking properties and a quality of flour above the average; in addition these varieties are to be resistant to black stem rust. Experiments have shown that, so far, no new variety is suited to replace Huron, but Huron is susceptible to black stem rust. The varieties Newthatch and Hope, which are resistant to black stem rust, are to be used to improve the black stem rust resistance of Huron by back crossing.

The Swiss winter rye varieties Witzwiler and Rothenbrunner are being compared with normal and short strawed Petkus rye, to decide whether short strawed rye has any advantages of practical importance.

New varieties of spring barley are being tested for yield, resistance to mildew and lodging and especially for brewing quality, when grown on soil of relatively high nitrogen content. A collection of 40 oat varieties is being tested to find high yielding varieties sufficiently resistant to lodging and to frit fly.

Hybrid maize varieties are being studied to find varieties suitable for Switzerland and for the production of maize for silage. Varieties are, also, required which can replace the Italian variety Nostrano dell'Isola and be useful to Tessin growers for seed production.

935. THORPE, H. C.

A note on the release of some new cereal varieties—II.

E. Afr. Agric. J. 1950 : 16 : p. 61.

Notes are given on the new wheats, Kenya Settler, Kenya Ploughman and 291 J Mark II, recently released to farmers by the Department of Agriculture, Kenya.

Kenya Settler was selected from Australian 26A x 117A. It is beardless, white chaffed, white grained, resistant to the eight races of black stem rust occurring in the Colony, resistant to yellow rust up to 8000 ft. and appreciably resistant to leaf rust. It has medium maturity and should be successful in all areas of Kenya with an altitude of 6000 to 8000 ft. and growing season of five to six months.

Developed from the cross DC x (Ceres 721 x 112E8L5), Kenya Ploughman is beardless, white chaffed, white grained, resistant to the eight races of black stem rust, and fairly resistant to leaf and yellow rusts up to approximately 8500 ft. It is recommended for all areas in Kenya with an altitude of 7500 to 8500 ft. and growing season of six months.

The wheat 291 J Mark II was derived from a single plant selection of 291 J111, made to purify this variety; it is suitable for all areas in Kenya where the parent wheat grows successfully, i.e. at altitudes ranging from 6000 to 7000 ft.

The barley Canadian Mariout has also been released as a six-rowed fodder barley suitable for all areas in the colony with an altitude of 5000 to 6500 ft. and growing season of four to five months. Purification of the variety is in progress as at present the barley is a mixture of two six-rowed types, one with an erect head and one with a pendent head.

Report of the Eighth Hard Spring Wheat Conference February 3-4, 1948. St. Paul Campus, Minnesota 1948 : Pp. 76. (Mimeographed).

The Leaf Rust Problem

Johnston, C. O. Prevalence and distribution of physiologic races of the leaf rust of wheat in the hard red winter wheat area. (pp. 1-2).

A survey of distribution of races shows that races 44 and 126 have recently increased in the southern and central plains, where they attack such varieties as Kawvale, Comanche, Pawnee, Austin and several Hope derivatives. Race 9 is most widely spread and abundant, race 128 is concentrated in the northern plains and race 11 on the Pacific coast.

*Caldwell, R. M. and Prevalence and distribution of races of leaf rust in
Compton, L. E. the soft red winter wheat area. (pp. 2-3).*

In the area east of the Mississippi leaf rust is confined mainly to the races 15, 76, 65, 9 and 80, in descending order of prevalence. The wheat derivatives from Hope, varieties Hope 44, Wabash and Vigo, have recently shown increased susceptibility, but a higher resistance derived from the varieties Chinese CI 6223, Frondoso, Fronteira and Surpreza continues to give resistant crops. New Warden derivatives promise continued resistance for future hybrids. It has become evident that neither field tests of mature plants nor tests of seedlings in the greenhouse are alone adequate for the determination of resistance.

Levine, M. N. Prevalence and distribution of the physiologic races of leaf rust in the hard red spring wheat area. (pp. 3-4).

In Minnesota, Montana, North Dakota and South Dakota the most regularly occurring races are 5, 9 and 15. Recently, races 35, 49 and 126 have occurred frequently, producing severe attacks on reputedly resistant varieties such as Henry, Cadet, Merit, Mida and Renown. There has been an apparent decrease in prevalence of 128 in the last few years. The most widespread races were 5, 37 and 126, which totalled a third of all the isolates identified.

Johnson, T. Prevalence and distribution of physiologic races of leaf rust in Canada. (pp. 4-6).

The sudden outbreaks of susceptibility in the varieties Renown, Regnet and Hope have been correlated with the evolution of new biotypes of races 1, 5 and 15. Most of the commercially grown wheats were formerly resistant to these races but in recent years fluctuations in susceptibility to these and also races 126 and 128 have been observed.

Ausemus, E. R. Varietal resistance to leaf rust. (pp. 6-8).

The Hope variety and its derivatives in North America have become susceptible to leaf rust due to an increase in the prevalence of race 128. Varieties known to be resistant have been crossed to obtain new lines, resistant in both the seedling and adult stages. *T. Timopheevi* x Steinwedel has produced Timstein, and three unnamed varieties II-39-46, II-39-2 and II-42-22 have been obtained from the crosses Hope x Timstein, Premier x Bobin² Gaza and Timstein x Newthatch respectively. Other sources of resistant varieties have been obtained from South America, Canada and Egypt.

Levine, M. N. Varieties resistant to leaf rust: seedlings and adult plants. (pp. 8-9).

The data from seedling tests at St Paul, Minn., using 120 hybrids and 36 physiological races, are available. High protoplasmic resistance was found in the lines from the crosses Hope x Timstein, Timstein x Newthatch and Premier x Bobin² Gaza. The effects of infection under field conditions depend on several developmental and environmental factors. Some varieties, such as Mida, possess a tolerance which could be combined by intervarietal hybridization with the high protoplasmic resistance possessed by others.

Johnson, T. and
Peterson, R. F.

Seedling and adult plant reaction to leaf rust.
(pp. 9-10).

Detailed tables are given of the seedling and adult plant reactions of foreign introductions and retested varieties in Winnipeg. The cross between Warden and Hybrid English shows both seedling and field resistance. Frontana also shows high field resistance. Other promising varieties include Klein Titan, Hope x Timstein and La Previsión.

Waldron, L. R.

Measurement of leaf rust injury. (pp. 11-12).

Two resistant durum wheats grown in North Dakota were used as standards with which the yields of varieties Thatcher and Rival Pilot were compared.

Johnston, C. O.

South American wheat varieties as sources of resistance to leaf rust. (pp. 12-15).

Many wheat varieties of Argentina, Brazil and Uruguay show seedling and adult resistance to several common leaf rust races. Data are provided in tabular form from which the varieties Aniversario, La Previsión 25, Titan and Apulia x Progreso CI 12587 appear to be the most resistant.

Peterson, R. F.

Present status of breeding wheat for leaf rust resistance and future plans. (pp. 15-17).

The main objective at the Dominion Laboratory of Cereal Breeding, Winnipeg, has been to obtain duplicate genes for resistance to all known races of leaf rust, in order to counteract possible susceptibilities which may arise. Derivatives from several resistant varieties have produced a cross Frontana x (RL 2265 x Redman²) which has very high resistance to both stem and leaf rust.

Any apparently new genes contributing to resistance are being used.

Waldron, L. R.

Breeding for resistance to leaf rust. (pp. 17-18).

The history of the basic breeding material employed at the North Dakota station is briefly given, with details of selections for rust resistance in more recent years.

Shands, R. G.

Present status of wheat breeding and future plans in Wisconsin. (pp. 18-19).

Attempts are being made to combine high quality, large yields, good straw and winter hardiness with resistance to rust races. The varieties Blackhawk, Fultz x Hungarian, Hope-Hussar CI 11682 and Shansi 480 have been used to reduce leaf rust losses. Lines from Thatcher x Hope W 38 have not been susceptible in the past two years and are being tested for yield and quality.

Ausemus, E. R.

Present status of breeding for leaf rust resistance.
(pp. 19-21).

Individual plants have been selected from the F₂ to the F₅ generations in the field, where they have been subjected to various artificial rust race epidemics. Seedling reactions were then determined, and trials for yield and quality were made at St Paul, Minn.

Resistance to all possible races has been added to the genotypes of present varieties by back-crossing and selection. It was decided to utilize Sear's series of monosomics and nullisomics to study location of factors for resistance in varieties.

The Stem Rust Situation in the Spring Wheat Region

Clark, J. A.,

Distribution and damage in uniform plots and nurseries. (pp. 21-22).

Johnson, T. and
Peterson, R. F.

The distribution and damage in uniform plots and nurseries are described. There were negligible losses of spring wheat on US farms in 1947, as most varieties used were resistant. In Canada the varieties Thatcher, Hope and the durum wheats were highly resistant. Several instances of rusting in nurseries due to artificially created epidemics of race 15B were reported.

Stakman, E. C. *Races of stem rust, up-to-date.* (p. 22).

The most important races in the US are now 56, 38, 17 and 19, but 15B is the most virulent. All races show stability at the present time.

Loefering, W. Q. and *Reaction of wheat varieties in the seedling state to*
Stakman, E. C. *races of Puccinia graminis tritici in greenhouse*
 tests. (p. 23-33).

A tabular form is used to summarize the results accumulated over the past five years of greenhouse tests on the reactions of 64 varieties in the seedling stage inoculated in the first leaf stage with pure races. Reactions have been put into the four classes, (1) resistant, (2) moderately resistant, (3) moderately susceptible and (4) susceptible. The table indicates the races from which these reactions were obtained.

Hart, H. H. *Sources of resistance, and results of rust and*
 disease nursery tests at St. Paul, Minnesota.
 (p. 33).

The effects of temperature, nitrogen source and light on stem rust reactions were discussed for several varieties. Some varieties change their reactions completely at different temperatures; Kenya and Newthatch were resistant at 65° F. and susceptible at 85° F. Thatcher was resistant when supplied with NH₄ forms of nitrogen, but with the NO₃ form it became susceptible.

Ausemus, E. R. *Sources of stem rust resistance and breeding*
 program at Minnesota. (pp. 34-37).

Both Thatcher and Hope are resistant to many races in the adult plant stage while other varieties such as Timstein, Kenya K 58 and 117 A, Red Egyptian, McMurachy and Frontana are resistant in the seedling stage. From these sources of resistance, standard methods of hybridization, back-crossing and selection are producing varieties in which seedling resistance is combined with adult plant resistance.

Wheat Stem Sawfly

Pepper, J. H. *History and prevalence.* (pp. 37-38).

A brief account is given of the history and prevalence of the sawfly infection which has now spread all over the US. The close relationship between the severity of fly infection and the maturity stage of the host at the time of egg laying is of importance in breeding resistant varieties.

Platt, A. W. *Progress in breeding wheat for sawfly resistance in*
 Canada. (pp. 38-39).

As the wheat variety influences the sex ratio of the flies hatched on it, those lines producing four males to one female are being developed in attempts to find a selection that produces all males.

The solid stem resistance of Rescue has broken down in North Dakota, but from the crosses (Mida x Cadet 1831) x Rescue, 4258 x Rescue, Cadet x Rescue, Rescue x Redman and Rescue x N 1315, lines of increased resistance and better quality are being produced.

Many *Agropyron* species are susceptible but *A. elongatum* is practically immune and tests are being carried out on its derivatives.

Sullivan, B. *What the milling industry wants in a wheat*
 variety. (pp. 40-42).

An account is given of the different qualities required for various baking processes, and of the varieties of wheat which meet these requirements.

Scab, Footrots, and Other Wheat Diseases

Ausemus, E. R. *Wheat scab.* (p. 42).

A classification of several varieties of wheat according to their reaction to *Fusarium* scab showed that although there are no highly resistant varieties, Rival and Pilot are the most

resistant and that susceptible types include Thatcher, Regent, Newthatch, Redman and Hope x Timstein 2776. The varieties Cadet, Mida, Mida x Pilot 1756 and Henry are intermediate in their reaction.

Machacek, J. E. The present status of cereal common root-rot investigations in Canada. (p. 43).

Tests for varietal resistance to root rot fungi have continued; among the most resistant is the variety Hope x Timstein, which exceeds the highly resistant McMurachy's Selection. Other resistant varieties include Marquis, Garnet, Thatcher and Apex.

Nagel, C. M. Root-rots of wheat. (pp. 44-46).

Brief accounts of the various fungal diseases known as root rot and the part played by different workers in the problem of disease control are given.

Progress in Breeding and Testing Durum Wheat for Quality

Anderson, J. A. A brief history of quality tests for durum wheats. (pp. 47-49).

An account of the development of methods of testing durum wheat quality is given. Attempts to produce a more desirable coloration of macaroni depends on varietal differences in: (1) quantity of carotenoids present; (2) amount of peroxidase activity, which has a decolorizing effect during processing; (3) the reaction producing an amber tinge; and (4) the occlusion of air bubbles.

Fifield, C. C. Higher quality macaroni for newer durum wheats. (pp. 49-52).

After reviewing the qualities of the older varieties of durum wheats, the correlation between a poor coloured macaroni and high ash content is emphasized. Some of the recently released varieties such as Carleton, Stewart and Venum have compared favourably with the older types. A new variety LD 279 (Ld 244 x Carleton) has a very high carotenoid content.

Harris, R. H. Micro milling and processing of single strand macaroni. (pp. 52-55).

The reliability of micro and macro milling tests for the comparative ranking of wheat varieties is discussed.

Benson, R. C. Experimental testing of varieties and types of durum wheat. (pp. 55-57).

Lists of varieties that are best adapted to spaghetti manufacture are given for five consecutive years. In the latest (1947) list Mindum, LD 303 and Carleton appear in descending order of preference.

Hetherington, E. V. Mill-control operations of durum wheats and durum products. (pp. 57-59).

With reference to the varieties commonly used for milling it was noted that the variety Mindum has continued to produce good coloured semolina and macaroni over a period of nineteen years.

Smith, G. S. Transgressive inheritance for earliness in durum wheat hybrid. (pp. 64-65).

A table of the dates of seeding of many hybrids derived by transgressive segregation from Mindum and Emmer, in comparison with Mindum, shows that the crosses Ld 271 x Venum and Khapli x Ld 271 are respectively 10 and 11 days earlier.

Plans for Future Work

Clark, J. A.

Summary of 19 years' results in spring wheat improvement. (pp. 65-68).

A comprehensive survey is given of the breeding work reported at the conferences held during the past nineteen years.

Smith, G. S.

Regional and state increase and distribution of new wheats. (pp. 68-70).

The plan of procedure for release of new varieties in North Dakota was outlined and provoked lengthy discussion.

Ausemus, E. R.

Suggested changes for uniform plant varieties. (pp. 70-72).

The list of uniform plot varieties for 1947 was presented. In a general discussion which followed, new proposals were made for the 1948 list.

Waldron, L. R.

Preparatory lists of wheats for the 1948 uniform regional nursery. (pp. 72-73).

L. R. Waldron presented a preparatory list, which was amended; a final list was approved for the eastern and western sections and for the 1948 uniform regional nursery.

Leaf rust conference. (pp. 74-75).

The outstanding results of the conference held at St Paul, Minn. prior to the general meeting were summarized by H. A. Rodenhiser. The varieties Corina, Brevit and Hussar have given reactions of a variable nature and are excluded as differentials. Supplemental host tests are being carried out with the hybrids Warden x Hybrid English and Hope x (Timstein x Minn II-39-46). In addition, the varieties McMurachy, Rio Negro, [McMurachy x (Warden x Hybrid English)] x Redman, Surpreza, Frontana and Cappelli are being used as sources of leaf rust resistance, while Kota, Webster, Haynes Bluestem, Arnautka, Pentad, Spelmar and Carleton have been excluded from future breeding programmes.

It was stated that a key of leaf rust races, which are being regrouped, is in preparation.

937. TAYLOR, J. W. and
BAYLES, B. B.

Report of the Uniform Southern Wheat Nurseries 1950.

U.S. Dep. Agric., Bur. Pl. Ind. Soils Agric. Engineering, Div. Cereal Crops and Diseases Washington 1950 : Pp. 14. (Mimeographed).

Tabulated results of varietal yield tests, obtained from nineteen nurseries, showed that those varieties which gave consistently high yields were Tenn. 46-1-1, a selection from (Surpreza x Hope-Hussar) x Shepherd-Leap, two selections from Leapland-Fronteira, Coker 47-27 and Trumbull-Frondoso. It was noted that the relative earliness of varieties varied at the nineteen stations. The outstanding variety for seedling disease resistance was Tenn. 47-1-20, a selection from (Hope-Hussar x Minturki) x Local Sel 88.

938. SCHAAL, W.

Seneca, new wheat, excels Thorne variety in yield and weight.

Crops and Soils 1950 : 3 : No. 2 : p. 25.

The winter wheat Seneca, a sister selection to Thorne, (cf. *Plant Breeding Abstracts*, Vol. IX, Abst. 678) has been released by the Ohio Agricultural Experiment Station. Compared with Thorne, it has slightly stiffer straw, somewhat improved yielding capacity and higher test weight per bushel. It resembles Thorne in being susceptible to scab.

- 939.

"O. 10" = Orlandi.

Agricoltura Tosc. 1950 : 5 : p. 340.

The administrative council of the Seed Producers of Bologna announces that the well known wheat O 10 has been designated Orlandi in memory of their director.

940.

Nuovi grani. (New wheats).

Agricoltura Tosc. 1950 : 5 : 339-40.

The following new selections are reported by the Seed Producers of Bologna.

The medium early O 9, derived from Norin 2 x Ciro Menotti and only recently released owing to its limited resistance to lodging, is a hardy wheat of medium height resistant to cold and rust and very high yielding.

From the cross Damiano x Mentana, the early, awned wheat O 14 was obtained. It is resistant to cold and rust and resembles Mentana but gives higher yields and is much more resistant to lodging.

R 12, derived from Allevamento [Strain] 137/1 x S. Giorgio, is an awned wheat very like S. Giorgio and may interest growers of the latter since it is not so tall and not subject to shedding.

941.

MICZYŃSKI, K.

Genetic studies in the genus *Aegilops*. IV. The inheritance of some characters in the intervarietal crosses of *Aegilops ventricosa* Tausch., *Ae. triuncialis* L. and *Ae. ovata* L.

Bull. Int. Acad. Cracovie 1949 (1950) : No. 7 : Sér. B : 233-58.

The characteristics of glume colour and pubescence, awn length of the lateral spikelets and waxy bloom on the ear and stem were investigated in a genetical analysis of several inter-varietal crosses within the species *Aegilops ventricosa*, *Ae. triuncialis* and *Ae. ovata*.

Differences between black and red glume colour in *Ae. ventricosa* were found to be dependent on one pair of genes, black being dominant.

When certain varieties of *Ae. ovata* were crossed there was complete dominance of black glumes over white and of pubescence over a scabrid glume surface; each appeared to be controlled by a single pair of genetic factors, segregating independently in the F_2 generation. Several strains of *Ae. triuncialis* differing in the degree of glume pubescence and the development of a waxy bloom were crossed. The crosses waxy x waxless always gave a waxless F_1 generation and an F_2 with the ratio of either 3 waxless : 1 waxy or 15 waxless : 1 waxy. Incomplete dominance of the pubescent glume was found in crosses between the glabrous and pubescent varieties. Some crosses showed linkage of the glabrous character with waxy bloom, but in others no linkage was observed. These results are explained by the author as follows. The pubescence of the glume depends on a single dominant factor H while the lack of waxy bloom is due to the action of polymeric inhibitory genes Z_1 and Z_2 . Z_1 is linked with the H gene for pubescence, while Z_2 is transferred independently. A series of multiple alleles controlling the development of glume hairs in *Ae. triuncialis* was indicated by crossing three different combinations of the glabrous, short and long haired types which themselves breed true. In all crosses the F_1 plants were intermediate, while the F_2 generation segregated into 2 or 3 distinctly different types according to the 3 : 1 or 1 : 2 : 1 ratio.

A detailed genetic analysis of the inheritance of the length of awns on lateral spikelets cannot be made until the F_3 generation from awnless x fully awned varieties has been obtained, as the F_2 produced a majority of short awned types, and some also of intermediate length.

942.

KATAYAMA, T.

(Studies on the tillering of rice and small grain cereals. III. Correlation between the number of leaves on the main axis and the earing date in barley and wheat varieties).

Proc. Crop Sci. Soc. Japan 1948 : 17 : No. 1 : 28-30.

The relation between number of leaves on the main axis, on the one hand, and earing and shooting dates on the other was investigated in 12 wheat, 11 hulled barley and 8 naked barley varieties. All three characters were positively correlated in the wheats, but in the barleys the number of leaves on the main axis was largely independent of the other two characters.

943. JUDANOV, I. M.
(Intervarietal hybridization as an efficacious method increasing the productiveness of wheat).
 Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 5 : 23-28.

Breeding work with wheat involving intervarietal cross pollination, supplementary fertilization, phasic analysis and Mičurinite training of the hybrids at the Miljutinskaja State Breeding Station is reported. The material comprised the best local standards and varieties from other districts showing promise in the irrigated and non-irrigated zones of the Uzbek SSR. The aims were productive hardy varieties resistant to drought, pests and diseases. The study of the hybrids showed that they were more adapted to unfavourable external conditions and that they were earlier, more vigorous and more productive. The F_1 hybrids from Pseudomeridionale 122 A x Graecum 752, Graecum 289 x Vatan [Motherland] and Surhak 5688 x Kzyl Bugdai [Red Wheat] showed resistance to bunt, which was absent in Kzyl Bugdai and the female parents of the first two crosses. The hybrids responded better to good soils than their parent forms, their productiveness being most remarkable in the wide crosses Erythrospermum 26783 x Surhak 5688 and Erythrospermum 841 x Surhak 5688. The 1000 grain weights of the hybrids were higher than those of their initial parents, the latter being more susceptible to drought. The superiority of the F_2 over the initial plant material is shown in a table giving data on their respective yields per ha., yields in percentages of the yield of the standard Graecum 287, 1000 grain weights, overwintering, height of plants, length of ears and the capacity for development of productive tillers. Most hybrids appeared to be resistant to smut and bunt and only some hybrids showed a small degree of susceptibility to yellow rust. Of the parent forms, Pseudomeridionale 122A, Graecum 289, Graecum 752 and Kzyl Bugdai were susceptible to bunt, Graecum 289 and Vatan to loose smut and all of them showed minor susceptibility to yellow rust. The hybrids maintained their vigour in the F_3 and F_4 , Erythrospermum 2878 and Erythrospermum 631, both derived from the cross between Erythrospermum 841 and Surhak 5688, being particularly productive. Back crosses of the F_2 from Erythrospermum 841 x Surhak 5688 and Erythrospermum 26783 x Surhak 5688 to Surhak 5688 (again as male parent) also increased the productiveness of the hybrids. Selections were made in the F_1 and F_2 of the more vigorous large grained and large eared families from all the crosses and they are being multiplied. The grain of the intervarietal hybrids is 100% vitreous and 1000 grains weigh between 45 and 52 grm. The seed has good field viability.

944. YAMADA, I. and SUZUKI, E.
(The relation between tetravalent occurrence in the progeny of the hybrid *Aegilops Heldreichii* x *Ae. comosa* and fertility).
 Jap. J. Genet. 1941 : 17 : 83-96.

Most of the F_1 hybrids of the above cross had one quadrivalent at metaphase I. In the F_2 two configurations, 7_{II} and $1_{IV} + 5_{II}$ appeared in a ratio of 1 : 1. The latter type gave rise to the same two configurations in the same ratio in the F_3 . The percentages of the two types of quadrivalents observed, N and U configurations, were determined in the F_3 and their behaviour during meiosis was studied.

Plants with tetravalents were less fertile than the normal type. The tetravalent is believed to have arisen from a simple translocation.

945. NAKAJIMA, G.
[Cytogenetical investigations on a fertile F_1 plant obtained by crossing *Triticum turgidum* ($n = 14$) and rye ($n = 7$)].
 Proc. Crop Sci. Soc. Japan 1948 : 16 : No. 3-4 : 32-34.

An F_2 hybrid generation of 42 individuals was obtained from 68 grains formed on an F_1 hybrid of *T. turgidum* and rye. The diploid chromosome numbers of the F_2 plants ranged from 40 to 45 with the mode at 42, indicating that the F_1 plant was an amphidiploid.

946. NAKAJIMA, G.
[Cytogenetical investigations of F_2 plants of *Triticum turgidum* ($n = 14$) x rye ($n = 7$) containing $2n = 41$ chromosomes].
 Proc. Crop Sci. Soc. Japan 1948 : 17 : No. 1 : 39-40.

Data are provided on the general morphology, and number of univalents, laggards and micronuclei in six F_2 individuals with $2n = 41$ chromosomes derived from *T. turgidum* x rye.

947. KONDO, N.
(Caryotype analysis in the wheat genus).
 Jap. J. Genet. 1941 : 17 : 124-32.

A review of work on caryotype analysis in *Triticum* is given in Japanese, with special reference to the papers by Câmara and his colleagues.

948. CÂMARA, A.,
 WAGNER, M. N. and
 GARDÉ, A.
Location of breaks induced by X-rays in chromosomes of *Triticum*.
 Genetica Iberica 1950 : 2 : 3-13.

The literature on the location of X-ray induced chromosome breaks is reviewed and supplemented by the authors' own observations with *Triticum*. It is concluded that the frequency of breaks is highest next the centromere, that tetraploid wheats are more susceptible to breaks than diploid or hexaploid wheats, and that the SAT chromosome of genome C is less liable to breakage. Explanations of these findings are discussed.

949. WAGNER, M. N.
The action of X-rays on chromosomes of *Triticum vulgare* Host (1).
 Genetica Iberica 1950 : 2 : 39-51.

Further evidence is put forward to show that the neighbourhood of the centromere and the ends are the parts of the chromosome most susceptible to X-ray induced breaks in *T. vulgare*. The light that this conclusion throws on the incidence of speltoids is discussed.

950. NAGAI, T.
[Varietal differences in the catalase activity of wheat seeds (preliminary report)].
 Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 114-15.

The catalase activity of 16 wheat varieties was determined at three different temperatures. In general, catalase activity, especially at lower temperatures, was correlated with early earing.

951. ROBINSON, A. D.,
 TOBIAS, C. H. and
 MILES, B. J.
The thiamine and riboflavin content of Manitoba grown wheat, oats, and barley of the 1947 crop.
 Canad. J. Res. 1950 : 28 : Sect. F : 341-50.

The influence of soil zone and variety on thiamin and riboflavin content was studied in an analysis of samples from the 1947 cereal crop raised in Manitoba, the results being compared with those of a similar investigation in the 1946 crop. In addition, correlation coefficients were determined for each of the vitamins with other constituents of the grains.

No varietal effect upon thiamin and riboflavin content was observed in oats or upon thiamin content of barley. A definite varietal effect upon thiamin content in wheat was noted; durum wheats showed higher levels of thiamin content than spring wheats.

952. KASAHARA, Y.
(On the correlation between germination in the ear and the reaction of the grain to staining with tyrosine and phenol in Japanese wheats).
Proc. Crop Sci. Soc. Japan 1948 : 16 : No. 3-4 : 45-47.

The intensity of the staining reaction of the grain of Japanese wheats to tyrosine and phenol was found to be positively correlated with the tendency to premature germination in the ear. Owing, however, to uncertainty as to the genetic explanation of this relationship, the author refrains from recommending the staining technique for diagnosing the likelihood of premature germination.

953. HIRAYOSHI, I.
(Systematics and blooming phenomena in the wheat genus and in related plants).
Jap. J. Genet. 1941 : 17 : 265-94.

Wheats of the Dinkel and Emmer groups head earlier than those of the Einkorn and *Timopheevi* groups. The period between heading and blooming is longer in the Einkorn group than in the other three groups. *Haynaldia* and *Secale*, however, take much longer than the Einkorn wheats.

Anther length is least in the Dinkel and *Timopheevi* groups. With regard to the percentage length of the anther that splits during dehiscence, the following values are reported: *Haynaldia villosa*, 12.06; the Emmer group, 28.36; the Einkorn group, 31.73; the Dinkel group, 62.99; the *Timopheevi* group, 67.96; rye, 82.85; and *Aegilotriticum* 98.18.

Data are also given on the part of the ear in which the spikelets first open and on the number of flowers blooming at any one time. Practically simultaneous flowering of all the spikelets occurs in various wheats of the Einkorn group, and in *Triticum Timopheevi*, *T. dicoccoides* and *H. villosa*.

954. YOSHIDA, S.
(On the duration of the receptive period of the wheat pistil and the vitality of the seed produced from it).
Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 150-52.

The Japanese wheat Saitama 27, emasculated a few days before flowering, became highly receptive to pollen a few days after the operation and remained thus till the eleventh day; thereafter the receptivity declined rapidly.

955. MIDDLETON, G. K. and
HEBERT, T. T.
Purple straw color in relation to kernel weight in wheat.
Agron. J. 1950 : 42 : p. 520.

An association between purple straw and high kernel weight has been recorded in the progeny of a cross between the wheats Purple Straw and Carala. Only in one out of the three years of testing the F_3 lines was a significant difference in yield found between the purple and white strawed types.

956. OKA, H.
Studies on the fluorescence of cereal grains.
Ber. Ohara Inst. 1942 : 9 : 91-115.

Varietal differences in the intensity of fluorescence from the surface of wheat and barley grains under ultraviolet illumination are reported. The curve relating number of varieties and fluorescence intensity appeared to be trimodal in both wheat and barley.

957. KONDO, M. and
KASAHARA, Y.
Feststellung der Sortenechtheit des Weizensaatgutes durch Tyrosin-
färbung. Vergleich mit Phenolfärbung. (**The determination of the
varietal authenticity of wheat grains through tyrosine staining.
Comparison with phenol staining**).
Ber. Ohara Inst. 1943 : 9 : 151-55.

The staining reaction of 158 Japanese and other wheat varieties to tyrosine has been ascertained. Four categories of varieties are recognized in respect of staining reaction. The results here obtained are compared with those obtained earlier for phenol staining. In general the two types of reaction are similar, but phenol is preferable as a practical means for identifying varieties.

958. MOROZOV, P. V.
(**The development of the embryonic roots in the embryo of hybrid
seed of spring wheat**).
Selekcija i Semenovodstvo (Breeding and Seed Growing 1950 : No. 5 :
28-35.

Embryonic development of several spring wheats and wheat hybrids was studied at the Institute of Grain Farming for the Southeastern USSR, with special reference to the development of their embryonic roots. The material included *Lutescens* 62, *Erythrosperrum* 841, *Milturum* 553 and hybrids between *Milturum* 553 and *Lutescens* 62 and *Erythrosperrum* 841 and *Lutescens* 62. Grain analyses showed that the embryonic roots, and the cotyledons are formed in spring wheats during the period of seven days to nineteen days after fertilization, after the scutellum is formed. There were heritable differences between the varieties regarding the extent of differentiation in their embryos of embryonic roots and other organs. The hybrids showed greater variability than the pure varieties in respect of the extent of differentiation of the embryonic roots. It was found that the varieties and hybrid families notable for early differentiation of the embryonic organs also developed better in the field under favourable external conditions, growing faster and developing more vigorous root systems than the other varieties and hybrids.

959. MIYAKE, M. and
SUETSUGU, I.
(**The relations between baking quality and other characters in
wheat varieties grown in a warm region**).
Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 67-68.

Baking quality and grain characters were studied in a collection of Japanese, Manchurian, Formosan and other wheat varieties grown at the former Ryushu Wheat Breeding Station. The superior baking quality of the more northern varieties was maintained.

960. IRVINE, G. N.,
WINKLER, C. A. and
ANDERSON, J. A.
(**Factors affecting the color of macaroni. III. Varietal differences
in the rate of pigment destruction during mixing**).
Cereal Chem. 1950 : 27 : 367-74.

Previous work has revealed that the destruction of xanthophyll pigments during mixing is due to oxidation in a reaction coupled with the peroxidation of unsaturated fats in the dough by lipoxidase; and that the cyanide ion, α -naphthol and alcohol act as inhibitors of the process of pigment destruction. The rates of pigment destruction during mixing in distilled water, 0.001 M cyanide, 30% alcohol and 0.001 M α -naphthol have now been investigated in *Triticum durum* varieties differing in macaroni quality. The characteristics of the oxidation reaction in each of the three media were in general found to be similar

among all the varieties, differences in quality emerging as differences in the rates of various phases of the reaction. An activity coefficient for each variety was calculated by dividing the pigment destroyed in the interval from one to four minutes of the mixing reaction by the amount remaining at the end of the initial reaction (after one minute). This coefficient is a varietal characteristic, providing a reliable index of enzymic activity and a reasonably good indication of the amount of pigment remaining after four minutes of mixing. The correlation between the activity coefficient and pigment content after four minutes mixing was 0.80 ($1\% = 0.68$). The coefficient also provides a useful index of macaroni quality when the amount of brown pigment is low.

961. FIFIELD, C. C. *ET AL.*
Milling and baking experiments with wheat varieties grown in Western United States, 1936-45.

Tech. Bull. U.S. Dep. Agric. 1950 : No. 1014 : Pp. 35.

Information is given on the chemical, milling and baking properties of 44 winter and spring wheats grown at experiment stations in the western United States, during the period 1936 to 1939. Among the determinations made on each sample were those for test weight, flour yield, carotenoid content, particle size index, dough ball time, ash content of the flour and protein content of grain and flour. Yellow loaf cake, biscuits and bread were made from the flour for the estimation of baking quality. All classes of wheat except durum and red durum were represented.

962. FIFIELD, C. C.,
WEAVER, R. and
HAYES, J. F.
Bread loaf volume and protein content of hard red spring wheats.
Cereal Chem. 1950 : 27 : 383-90.

Data are given on the relation between loaf volume and flour protein in samples representing the varieties of hard red spring wheat grown for four years under a wide range of climatic and soil conditions in the United States. The relation between loaf volume and flour protein for each variety was linear between the limits of protein which occurred, i.e. approximately 8.5% to 18.0%. The bread baking quality of each variety was essentially the same in different years, as shown by the fact that the regression lines for loaf volume on protein content for any variety were similar for each of the four crop years. The level and slope of the regression lines differed significantly, indicating varietal differences in protein quality.

963. SERVI, G.
Elenco delle principali razze di frumento interessanti la Toscana. (A
list of the main varieties of wheat of interest for Tuscany).
Agricoltura Tosc. 1950 : 5 : 443-46.

The list of over three pages gives the names of the varieties, their origin, resistance to lodging, ear shape and ear colour at maturity, and time of ripening.

964. B-I.
Försöksgården Tönnersa—den första i landet i ett hushållningssällskaps regi. (The Tönnersa Experimental Farm, the first in the country under theegis of a provincial agricultural society).
Lantmannen 1950 : 34 : 576-77.

At this new Swedish Experimental Farm, established by the Halland Agricultural Society, the resistance of wheats to shedding and consequent suitability for combine harvesting is to be investigated.

965. CIFERRI, R. and
MINERBI, G.
Seconda inchiesta sulle razze di frumento coltivate in Italia nel 1940-41.
(**Second enquiry on the varieties of wheat cultivated in Italy in 1940-41**).

Atti Accad. Georgofili, Firenze 1947 : Pp. 26.

Under the auspices of the Georgofili Academy in Florence an enquiry has been conducted regarding the wheats grown in northern, central and southern Italy, including the islands. The results have now been published under three heads: (1) replacement of old varieties by élite varieties; (2) the percentage area under the various élite varieties in each province; and (3) spring wheats. The data are presented mainly in tabular form with notes on variations observed in the predominance of the élite or the old varieties in the different provinces.

966. YAMADA, T. and
FUJIYOSHI, S.
(**Studies on methods of culture in the early generations of wheat hybrids. II. Competition between intermixed genotypes**).
Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 20-23.

Ten wheat varieties were compared in respect of their development when sown in univarietal lots, and when sown intermixed. Differences were noted in the way in which varieties were affected by competition with other varieties and it is recommended that in testing segregating populations, characters such as earing date and culm height, which are least affected by competition, should provide the selection criteria, and that thin sowing to minimize competitive interaction should be practised.

967. FERNANDO, Z.
Il cosiddetto ibrido Mazzoli. (**The so-called Mazzoli hybrid**).
Agricoltura Tosc. 1950 : 5 : 367-68.

The variety of wheat, wrongly known as Ibrido, is recommended to Italian farmers. It is a selection made by M. Paolo from a variant of Virgilio and is resistant to spring frosts, rust, lodging and shedding. It yields very well, particularly in hilly or even mountainous regions owing to its hardiness.

968. STOJKOVIĆ, L. and
KSILOVSKI, S.
Jaro-ozima pšenica 1439/3. (**The alternative wheat variety 1439/3**).
Radovi Poljoprivred. Naučno-Istraživačk. Ustanova, Beograd 1949 : 1 : 21-26.

Individual selection of a wheat population at the Novi Sad Agricultural Scientific Research Station has given a promising new wheat variety 1439/3, which can be grown both as a winter or spring crop. As a winter wheat it is as productive as or more productive than the local winter wheats, while as a spring crop it invariably outyields the local spring varieties. In the three years' trials the seed harvested from the winter crop developed normally when it was sown in the spring with vernalization treatment. The variety is resistant to cold, drought, lodging and loose smut and tolerant of rust. Further training of the variety to fix its dual purpose character is in progress.

969. FUCHS, W. H. and
BEILER, A.
Über die Heisswasserempfindlichkeit der Karyopsen des Weizens I.
(**On the sensitivity to hot water of the caryopses of wheat I**).
Ber. dtsch. Bot. Ges. 1943 : 61 : 164-74.

Using the tetrazolium test, modified in some respects, the authors found that different genotypes of wheats harvested from the same locality near Halle varied in their reaction to the hot water treatment.

970. MICZYŃSKI, K.

Zimotrwałość odmian pszenicy w doświadczeniach polowych w r. 1946-47. (**The winter hardiness of wheat varieties in field experiments in the year 1946-47**).

Przegl. Roln., Poznań 1949 : 4 : 134-38.

Comparative tests were made in eight localities to test the winter hardiness of 40 wheat varieties; the tests were made with at least three and generally four or five replications. The winter hardiness of the varieties was greater in some localities than in others. The varieties were classified from the results into five groups and in a descending sequence according to their hardiness. Group I, which showed the highest winter hardiness, comprised Wysokolitewka Antonińska, Barbarossa, Dańkowska Mary Wu which is a little known variety, Dańkowska Seleckcyjna, Wygnanka [Outlaw], Ostka Sołacka [Awed Sołacka] and Dankowska Graniatka. Varieties in group II which also showed high degrees of winter hardiness were: Tryumf Mikulic [Mikulice Triumph], Pszenżyto [Rye-wheat 18], Eka, Dańkowska Graniatka Zachodnia [Western Dankowska Graniatka], Zofia [Sophia] and Wysokolitewka Sztywnosłoma [Stiff Strawed Wysokolitewka]. The least winter hardy varieties were those in group V, e.g., Crievenier 192, Herold, Stieglere 22, Salzmünder Standart, Carstens V and finally Lwowianka [Lwów] which, however, showed a somewhat higher value for winter hardiness in another series of tests on a smaller scale. Wysokolitewka Antonińska has markedly improved in winter hardiness since previous tests were made, when it showed only a medium degree of winter hardiness. Further breeding for improved winter hardiness without loss of other valuable characteristics is needed in the majority of the varieties tested.

971.

New variety of spring wheat.

Soviet News 1950 : No. 2455 : p. 4.

A new high yielding spring wheat of good quality has been obtained by selection from Ukrainka winter wheat. The new variety is resistant to the dry steppe winds and many diseases.

972. SMITH, H. C. and

BLAIR, I. D.

Wheat powdery mildew investigations.

Ann. Appl. Biol. 1950 : 37 : 570-83.

The wide range of varieties resistant to *Erysiphe graminis* f. *Tritici* have been grouped, as a result of investigations at Canterbury Agricultural College, Lincoln, New Zealand, as follows: (1) *Triticum vulgare* varieties with adult plant resistance; (2) *T. vulgare* varieties with seedling resistance to races 3 and 4; (3) *T. vulgare* varieties with mildew resistance derived from *T. durum*; and (4) varieties with mildew resistance derived from *T. Timopheevi*, *T. monococcum*, *T. persicum* and rye.

973.

Quanah, Texas wheat, to be released in 1950, resists rust and bunt.

Crops and Soils 1950 : 3 : No. 1 : p. 27.

The new hard red winter wheat Quanah, developed cooperatively by the US Department of Agriculture and the Texas Agricultural Experiment Station, is resistant to bunt and leaf and stem rust; some races of leaf rust may however injure the variety. It is non-hardy and susceptible to loose smut. In yield at most locations it has equalled and exceeded Comanche, which formed one of its parents. Further breeding is in progress to transfer loose smut resistance and improved leaf rust resistance to Quanah by back-crossing.

974. BRIGGS, F. N. and
HOLTON, C. S.
**Reaction of wheat varieties with known genes for resistance to
races of bunt, *Tilletia caries* and *T. foetida*.**
Agron. J. 1950 : 42 : 483-86.

Information is given on the reaction of wheat varieties to 25 races of *T. caries* at Pullman, Washington. The genes for resistance possessed by the varieties had previously been identified in studies at Davis, California, using a single collection of *T. caries*. The varieties comprised: Martin, White Odessa, Sherman, Banner Berkeley, Odessa and Hussar, all with the gene *M*³ for resistance, and in the case of Hussar also the gene *H*; Oro and four strains of Turkey, carrying factor *T*; Rio with *R*; Turkey (CI 10016) with the major genes *T* and *R* for resistance and the weak genes *X* and *Y*⁴; and Turkey CI 10015, carrying *X* and *Y*. The gene *M* derived from Martin and either *T* from Turkey or *R* from Rio together confer resistance to all 25 known races of *T. caries* and also to dwarf bunt. Breeding for bunt resistance is therefore a simple problem so far as known races are concerned. Furthermore, the breeder will only need to test hybrid stock for reaction to two races, since either T-16 or L-8 will serve as a tester for *M* and any one of the other races as a tester for *T* or *R*.

975. PERIŠIĆ, M.
[Studies of resistance to *Tilletia tritici* (Bjerk.) Wint. on several
lines of wheats, developed at the Breeding Station of the Zemun
Faculty of Agriculture and at the Topčider Institute for Agricultural
Research].
God. Poljoprivredn. Fakult., Beograd 1949 : No. 2 : 313-18.

A Topčider line of wheat, 19, and the Zemun lines 27, 48 and 78 gave good accounts of themselves in Yugoslav trials in respect of resistance to bunt.

976. Informaciones de interés para los trabajos de selección de plantas
resistentes a la carie. (Information of interest for breeding plants
resistant to bunt).
Hoja Inf. Min. Agric. Nac. Direcc. Gen. Invest. Agríc. Inst. Fitotec.
1948 : No. 8 : Pp. 2.

Argentine wheat varieties resistant to *Tilletia caries* and *T. foetida* are listed.

977. SCHLEHUBER, A. M.
**Reaction of varieties and inheritance of resistance to races of
leaf-rust, *Puccinia rubigo-vera tritici* (Eriks.) Carleton in hard
red winter wheat.**
Z. Pflanzenz. 1950 : 29 : 193-208.

Data obtained at the Oklahoma Agricultural Experiment Station, US, of the reactions of varieties and the inheritance of resistance to races of *Puccinia rubigo-vera* var. *Tritici* are presented in tabular form.

Under greenhouse conditions, seedlings of sixty wheat varieties and strains were tested for resistance to eight races. No variety was resistant to all eight races, the highest degree of resistance being to five races; this was found in the variety Comanche x Blackhull-Hard Federation Wd44h2-187. Twenty-eight strains were susceptible to all eight races. Over a three year period, the adult plant resistance to natural infection was highest in the variety Hard Federation Hybrid (CI 12515); there was less than 10% infection in the following: Quanah (CI 12145), Comanche x Blackhull-Hard Federation (CI 12517), Blackhull-Oro x Pawnee (CI 12516), Kawvale-Marquillo x Kawvale-Tenmarq (CI 112128) and Westar (CI 12110).

The inheritance of reaction to race nine was found to be dependent on a single recessive factor pair in the crosses (Mediterranean-Hope x Pawnee) x Comanche, (Oro x Mediterranean-Hope) x Comanche, (Kawvale-Marquillo x Kawvale-Tenmarq) x Cheyenne and (Kawvale-Marquillo x Kawvale-Tenmarq) x Comanche. The reaction to races 12 and 45 in the F_2 generation of the cross (Mediterranean-Hope x Pawnee) x Cimarron was not compatible with any known genetic ratio; as all selections were susceptible in the F_3 generation, no conclusions could be made on the mechanism of inheritance.

978. THOMAS, I. and
WATSON, E. R.
New cereal varieties in Australia—1948-49.
J. Dep. Agric. W. Aust. 1950 : 27 : 269-72.

Several new wheat varieties developed at the Waite Institute for resistance to *Puccinia graminis* f. *Tritici* have been released for use in Western Australia; they were derived by repeatedly back-crossing selected high yielding varieties having Gabo as the non-recurring parent. Registration under the names Bencubbin 48, Dundee 48, Javelin 48, Rapier 48, Ridley 48, Scimitar 48 and Seewari 48 indicates the recurrent parent in each back-crossing, with the addition of a numeral denoting the year of registration. White Federation 45 was submitted for registration as a rust resistant variety for breeding only.

At the Temora Experiment Farm, New South Wales, two varieties, Brolga and Curlew, resistant to flag smut but susceptible to stem and leaf rusts, have been produced from the crosses Bobin x Dundee and (Bobin x Dundee) x Gular, respectively.

979. **New Lee wheat excels in leaf-rust resistance.**
Crops and Soils 1951 : 3 : No. 4 : p. 28.

Resistance to all races of leaf rust has been obtained in a new early maturing spring wheat variety, named Lee, produced at the Minnesota Agricultural Experiment Station. This variety is intended for use in Minnesota, North Dakota and Wisconsin where leaf rust is a serious problem; it is, however, susceptible to loose smut, bunt, scab, bacterial black chaff and race 15B of stem rust.

980. ELEFThERIOU, V.
Stem rust of cereals.
Countryman, Cyprus 1950 : 4 : No. 9 : 10-11.

Tests in Cyprus have shown that none of the good local wheat varieties is resistant to stem rust. The Department of Agriculture is now importing and testing varieties from other countries. Of these, BXIPI from Palestine and Giza from Egypt are recommended for use in suitable areas.

New varieties have been produced by crossing local varieties with imported resistant ones and some have already given good results. In a test of over 30 of these hybrids some were not affected by a very severe attack of stem rust. Imported varieties used in the crosses included Thatcher, Simpson Longai, Mentana, 117/A, 1/39 and 70/39.

981. MAYER, R.,
JONARD, P. and
FOSSEUX, G. DE
Essais de blé d'automne dans la Région Parisienne, la Normandie et le Nord de la France. (**Trials of winter wheat in the region round Paris, in Normandy and in northern France.**)
Bull. Tech. Inform. Ingén. Serv. Agric. 1950 : No. 53 : 623-38.

The results obtained in wheat variety testing at 50 centres in France are recorded in tabular form, with information on the types of soil on which the various trials were carried

out and on earliness and resistance to cold and disease. The relations between tillering capacity, grain weight and fertility of the ear as factors of yield are exemplified from the performance of some varieties in certain regions.

982. GIORGINI, G.

Direttive granarie agli agricoltori aretini nell'imminenza della nuova campagna 1950-51. (Directions regarding wheat to the farmers of Arezzo at the outset of the new season 1950-51).

Agricoltura Tosc. 1950 : 5 : 293-96.

In recording the performance of various Italian wheats, the writer singles out for special mention Rondine, derived from the cross Aquila x Autonomia, and formerly designated 2/2. It surpassed all other varieties, and, on some types of soil, gave record yields, e.g. 53.21 q. per ha.

Varieties for the 1950-51 season are recommended.

983. FUMELLI, A.

Consigli per i granicoltori della Provincia di Pisa. (Advice for the wheat farmers of the province of Pisa).

Agricoltura Tosc. 1950 : 5 : 297-306.

Yields of many Italian wheats in the annual competition are given with notes on their individual performance on farms in hilly and other districts with various types of soils.

984. MONACI, M.

Nuove razze di grano nella Val di Chiana Senese. (New varieties of wheat in the Val di Chiana Senese).

Agricoltura Tosc. 1950 : 5 : 331-34.

The performance of a number of Italian varieties of wheat in the Val di Chiana Senese is reported for the information of farmers.

Varietal resistance to late frosts, lodging and rusts was recorded. A table is included showing the origin of the various soft wheats bred by Michahelles.

985.

Nebred wheat ranks high in 1950 Nebraska variety trials.

Crops and Soils 1951 : 3 : No. 4 : p. 24.

In varietal tests, the new Nebred wheat gave consistently high yields which exceeded those of the variety Pawnee in southeastern and east central Nebraska. The variety Cheyenne outyielded Nebred however in the western region.

BUCKWHEAT

986. KOTUKOV, G. N.

(A method for producing hybrid buckwheat seed).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 5 : 63-65.

Hybridization work with buckwheat at the Korostenj Base of the Ukrainian Scientific Research Institute of Socialist Agriculture is reported. The cross pollinated varieties used were the productive cultivated variety Bogatyryj [Hero], the local variety Terehovskaja which is noted for its earliness, uniform flowering and good grain setting and the productive local variety Manuiljskaja. The problem of heterostyly was overcome by the segregation of the parental rows with the long styled plants from those with the short styled plants. This was effected by the removal of plants with short styles from some alternating rows of varieties to be crossed and by the elimination of individuals with long styles from others.

The negative selection for the type of style was begun after the opening of the first florets and continued for 2-3 days afterwards. The crosses were facilitated by Musiiko's supplementary fertilization method (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 826).

As a result of intervarietal crosses vigorous and fertile hybrids were obtained. The yield of the F_1 was appreciably higher than that of the initial varieties, some individuals giving increases of 28.2%, 34.5%, 47.7%, 51.1% or 84.1%. The most productive hybrids were obtained from the crosses between Bogatyrj x Terehovskaja and Manuiljskaja x Terehovskaja. The productiveness of hybrids obtained from the crosses between the long styled parents was greater than that of the hybrids from the crosses between the short styled parents of the same varieties. This is shown by a comparison of yield increases expressed in percentages of the yields of the initial varieties. The yield increases for Bogatyrj were 5% for the short styled hybrids and 46.5% for the long styled hybrids, the corresponding yield increases in the hybrids of Manuiljskaja were 27.6% and 42.8% and of Terehovskaja hybrids 5.7% and 22.2% respectively.

987. PISAREV, V. E.

(A path leading to high yields of buckwheat).

Sovetskaja Agronomija (Soviet Agronomy) 1950 : No. 6 : 51-56.

The aims of Soviet selection work with buckwheat are uniformly developing varieties, which are hardy, and moderate in their moisture requirements.

OATS

988. NISHIYAMA, I.

(Cytogenetical studies on *Avena* IV. Distorted Mendelian ratios due to differential fertilization).

Jap. J. Genet: 1941 : 17 : 247-64.

A diploid strain designated green inconstant which always segregated green and albino seedlings in a 1 : 1 ratio and gave no homozygous greens appeared in the F_3 of triploid hybrids between *A. barbata* ($n = 14$) and *A. strigosa* ($n = 7$). Investigations showed the genetic formula for 'green inconstant' to be $\frac{al + +}{+ Re \lambda}$ where *al* is a gene for albino, *Re* for

early ripening and λ for zygotic mortality. Two types, $\frac{al + +}{+++}$ and $\frac{+++}{+ Re \lambda}$ (early), were found in the F_1 hybrids between green inconstants and normal *A. strigosa* plants. In the next generation the first type gave a 6 : 1 or 5 : 1 ratio of green to albino seedlings, while the second type gave a 1 : 1 ratio of early to normal seedlings. *Re* and λ are closely linked. Pollen of different genetic constitution was found to accomplish fertilization with different frequencies, which distorts the segregation ratios.

In the offspring of an early heterozygote, $\frac{+ Re \lambda}{+++}$, a new strain appeared in which earliness was under monogenic control. This type may have lost λ and a factor or factors for differential fertilization.

989. VINOGRADOVA, N. M.

(Free intervarietal cross pollinations of oats and barley).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 5 : p. 74.

In experiments conducted at the Institute of Grain Farming for the Non-Black-Earth Belt intravarietal free cross pollination of the oat variety Nemčinovskii resulted in 7.1% seed setting and intervarietal free cross pollination in 4.3% setting. Artificial intervarietal hybridization gave much the same percentages of setting. The seed obtained by the latter

method is regarded as inferior to the seed resulting from selective cross pollination within a variety and between varieties.

Similar experiments with the barley Viner gave a 25.7% set in natural intravarietal crosses and 22.5% in natural intervarietal crosses. Artificial intravarietal and intervarietal crosses resulted in a set of 65.9% and 70.1% respectively. The superior biological properties of the seed produced by plants as a result of selective fertilization and the adequate set of the oat and barley varieties in free cross pollination trials supply an argument against artificial hybridization of oats and barleys. In an editorial footnote to the paper reference is made to successful experiments with free cross pollinated barleys at the USSR Institute of Breeding and Genetics. The percentage set in free cross pollination of the oat variety referred to above is considered too low to ensure the biological advantages of selective fertilization.

990. GIGLIOLI, L.
Nuove varietà di avena alla prova. (**New varieties of oats under trial**).
Agricoltura Tosc. 1950 : 5 : p. 418.

In trials in Livorno province the oats Angelica and Astra, which can be sown in autumn, winter or spring, have proved satisfactory in yield and resistance to lodging owing to their short straw. They are suitable for growing in mixtures.

991. SHEALS, J. G.
Observations on blindness in oats.
Ann. Appl. Biol. 1950 : 37 : 397-406.

A study of possible factors causing blindness in oats in North Wales has led to the conclusion that most of the blindness is the result of adverse physiological conditions probably operative during early growth. Significant varietal differences in susceptibility to blindness were established in winter but not in spring oats.

992. GRAFIUS, J. E. and
DIRKS, V. A.
James hullless oats.
Bull. S. Dak. Agric. Exp. Sta. 1950 : No. 401 : Pp. 3.

The new hull-less oat James [(Bond x Double Cross Bond) x Nakota] possesses the White Russian type of stem rust resistance, being susceptible to races 3 and 7. Its leaf rust resistance is of the Bond type, the variety showing susceptibility to race 45. In addition, it has smut resistance of the Markton type and hence resistance to all known races of *Ustilago Avenae* and *U. Kollerii*. James is stiff strawed and mid-early and has produced a high yield of good quality grain in eastern South Dakota. In comparison with Nakota the new variety shows improvement in earliness, test weight and resistance to lodging and leaf rust.

993. LITZENBERGER, S. C.
Inheritance of resistance to specific races of crown and stem rust, to *Helminthosporium* blight, and of certain agronomic characters of oats.
Res. Bull. Ia Agric. Exp. Sta. 1949 : No. 370 : 454-96.

The inheritance of resistance to various races of *Puccinia coronata* var. *Avenae*, *P. graminis* var. *Avenae* and *Helminthosporium Victoriae* was observed in six oat crosses involving varieties of *Avena sativa* and *A. byzantina*. Segregation for resistance to stem rust races 2 and 8 was dependent on single factor pairs in the crosses Mindo x Landhafer, Mindo x Tama,

Santa Fe x Clinton and D67 x Bond, but on three factor pairs in the cross Sac x Hajira-Joanette. The varieties Mindo D67, Clinton and Sac all possess a single dominant gene for resistance to the two races. Observations on the Tama x Mindo cross suggest an allelomorphic series of factors for resistance to races 2 and 8.

Observed segregation for reaction to races 1 and 45 of crown rust was on a monogenic, digenic or trigenic basis in different crosses. Five different factors for resistance were identified, among these a simple dominant of the hypersensitive type. This hypersensitive resistance to crown rust and susceptibility to *Helminthosporium Victoriae* proved to be dependent on the same factor pair. To avoid use of this factor for crown rust resistance, dominant factors from the varieties Santa Fe or Landhafer are being introduced.

Stem rust reactions and factors governing crown rust resistance are inherited independently of each other and of characters such as basal hair number, earliness and dwarfness. Reaction to blight is independent of dwarfness. Stem rust resistance and nodal pubescence were strongly linked in three crosses, providing a valuable visual aid in selection of rust resistant progeny in hybrid populations.

994. POEHLMAN, J. M. and
KINGSOLVER, C. H.
**Disease reaction and agronomic qualities of oats selections from
a Columbia x Victoria-Richland cross.**
Agron. J. 1950 : 42 : 498-502.

Development of varieties combining resistance to crown rust and Victoria blight is a major problem in oat breeding, as a result of the close association between resistance to crown rust and susceptibility to Victoria blight in varieties of Victoria origin, and also the increase of races of crown rust infecting varieties of Bond origin in epidemic proportions. Some selections derived from a single F₅ plant of the cross Columbia x Victoria-Richland show resistance to Victoria blight and an intermediate type of resistance to crown rust. It is hoped that these strains will eventually prove useful in the southern part of the area of spring oat cultivation in the USA, where crown rust infection is less severe than in the central and northern areas. The strains are also resistant to smut and races 2 and 5 of stem rust.

995. Forsøg med havresorter 1945-1948. (Oat variety trials 1945-48).
Tidsskr. Planteavl 1950 : 53 : 725-28.

The performance and origin of the Danish oats, Pajbjerg Rex, Borris Opus, Pajbjerg Regin, Abed 11/42, Abed Minor and Abed 206 are recorded from results of trials in competition with the Svalöf varieties Stål [Steel] and Örn [Eagle].

996. PENDLETON, J. W.,
BEVER, W. M.,
DUNGAN, G. H. and
BONNETT, O. T.
Spring oats for Illinois.
Circ. Ill. Agric. Exp. Sta. 1950 : No. 659 : Pp. 8.

The results of spring oat variety trials in Illinois are tabulated and information is given on the incidence of diseases in 1949. Recommended varieties are listed.

RYE

997. KUZNECOV, V. S.
(Sowing winter rye with cross-pollinated seed).
Sovetskaja Agronomija (Soviet Agronomy) 1950 : No. 8 : 89-92.

In experiments at the Timirjazev Agricultural Academy the rye hybrids between Vjatka Moskovskaja [Moscow Vjatka] and Voronežskaja SHI [Voronež Agricultural Institute]

were superior to the plants from pure varietal seed. They eared earlier, tillered more extensively and were more productive and more resistant to drought and cold. Their seed was of better quality. Mixing the seed of the two initial varieties was a more satisfactory method than planting pure seed on adjacent plots or rows. It is suggested that in applying this method to industry the seed of two standards adapted to the local conditions should be grown in this manner.

998.

Foreløbig meddelelse om forsøg med rugsorter 1946-1948. (**Preliminary communication on rye variety trials 1946-48**).

Tidsskr. Planteavl 1950 : 53 : 723-24.

The performance of Danish and Swedish ryes in trials at nine experimental centres in Denmark is briefly recorded, with tables showing the yields of grain and straw. Borris Perle [Borris Pearl] rye outyielded its six competitors at eight centres and ranked second at the ninth centre. Its grain quality is good and its straw is stiff, but very long.

MAIZE

999.

U.S. scientists help Mexico improve corn strains.

Crops and Soils 1951 : 3 : No. 4 : p. 25.

An improved open-pollinated maize, Rocamex, has been developed for cultivation at high altitudes in Mexico with the cooperation of the Rockefeller Foundation.

1000.

STOJKOVIĆ, L. and
GIBŠMAN, E.

(**Breeding the Novosadski yellow dent maize**).

Radovi Poljoprivred. Naučno-Istraživačk. Ustanova, Beograd 1949 : 1 : 11-20.

As a result of breeding work with maize conducted at the Novi Sad Agricultural Scientific Research Station, Vojvodina, a mid-season maize variety Novosadski Zlatni Zuban [Novi Sad Yellow Dent] has been obtained. It is earlier and more productive than the local varieties. The variety is resistant to drought and diseases. It was derived from the local Beljski [Belje] dent maize by individual family-group selection. The method involved the remnant system of selection. Safeguards against the ill effects of inbreeding were taken by incorporating families of different origin.

1001.

HUBER, L. L.,
SEEM, B. L. and
JOHN, M. D.

Pennsylvania corn performance studies. Double cross tests, 1948.

Progr. Rep. Pa. St. Coll. Agric. Exp. Sta. Dep. Agron. 1949 : No. 10 : Pp. 14.

The results of tests on the performance of experimental double hybrids of maize carried out during 1948 are summarized. In addition, information on cultural aspects of efficient maize production was gained, reference being made to the optimum plant population, the prime importance of soil fertility among the environmental factors influencing yield, the differential response of hybrids to nutrient deficiencies, and the complexity of the response to a given environmental factor.

1002.

ROGERS, J. S.

New hybrids spur Texas acreage.

Sth. Seedsman 1950 : 13 : No. 11 : 18, 51, 54.

The yellow hybrids Texas 26 and Texas 28 have outyielded older hybrids in tests in all maize growing areas in Texas with the exception of the Gulf Coast. They have also shown

improved resistance to insects, diseases, root lodging and stalk breakage. Texas 26, a hybrid of three yellow dent inbreds and one inbred of Yellow Surecropper, matures in about 118 days. Texas 28, a combination of two yellow dent inbreds and two inbreds of Yellow Surecropper, usually matures in 120 to 125 days. Promising experimental hybrids showing improvements over existing commercial hybrids are under test at the Texas Agricultural Experiment Station. Attention is also being given to the development of male sterile inbreds to eliminate detasseling in hybrid seed production.

1003.

Six new corn hybrids announced at Nebraska.

Crops and Soils 1950 : 3 : No. 1 : p. 28.

The release of the new maize hybrids Nebr. 801W, Nebr. 504, Nebr. 301, Iowa 4417, Nebr. Experimental 893B and Nebr. Experimental 1219B is reported. Nebr. 801W is the first white hybrid developed by the Nebraska Station; it is adapted to southeastern Nebraska. Nebr. 504 is well adapted to the central part of the state; Nebr. 301 shows promise as a "replant" type in areas of relatively short season. Iowa 4417 is an early hybrid suitable for non-irrigated plantings in the Panhandle area. Both of the two last named hybrids are suitable for southern and east central Nebraska.

1004.

BRYAN, W. W.

Queensland certified hybrid maize. Part I. The story in general.

Qd Agric. J. 1950 : 71 : 187-96.

A report is given on the general development of hybrid maize production since 1925.

1005.

BLANCO, J. L. and

OLIVEIRA, A. J. DE.

Hibridación en cadena. Producción de emergencia de semilla híbrida de maíz. (Chain crossing. Emergency production of hybrid maize seed).

Genetica Iberica 1950 : 2 : 15-27.

A system of combining inbred lines by repeated three-way crosses of the type (((A x B) x C) x D) . . .) x N is recommended. Chain crosses in Galicia have given grain yields comparable to those of single and double crosses.

1006.

LONNQUIST, J. H.

The effect of selection for combining ability within segregating lines of corn.

Agron. J. 1950 : 24 : 503-08.

The results of experiments at the Nebraska Agricultural Experiment Station have led to the conclusion that early testing of S_1 lines or S_0 plants of maize in top crosses provides a more efficient test of combining ability and thus a more satisfactory basis of selecting material for inbreeding than does a random sampling of the same population based upon visual selection in early inbred generations. The combining ability shown by S_1 lines derived from the open-pollinated variety Krug was greatly modified in subsequent selfed generations, from the S_2 to S_4 , by selection for high or low combining ability among a series of sublines within each family, selection being based upon the top cross performance of sublines after each generation of inbreeding. S_1 lines classed as high or low in combining ability provided equal opportunity for modifying combining ability in subsequent selfed generations, although the highest yielding S_4 lines were derived from S_1 lines with high combining ability.

1007.

Experiencias con maíces híbridos americanos. (**Experiments with American hybrid maize**).

Bol. Inform. Minist. Agric. Madrid 1950 : 3 : No. 22 : 26-28.

Trials of American maize hybrids are reported from Jerez de la Frontera, Sevilla and Málaga. The most promising American hybrids outyielded Spanish varieties and were less susceptible to lodging and smut.

1008.

HOFMEYR, J. D. J.

Application of male sterility in the production of hybrid maize.

Fmg S. Afr. 1950 : 25 : 281, 296.

The possible method of utilizing cytoplasmically inherited pollen sterility in the production of hybrid maize seed without detasseling is outlined, with reference to work on male sterility in the United States. The author is of the view that the F_1 hybrid commercial seed produced by such a method should consist of 80% of the male sterile form of the double cross, and 20% of the normal double cross which comprises the same inbred lines as the former except for the character of male sterility.

1009.

STONOR, C. R. and

ANDERSON, E.

Maize among the hill peoples of Assam.

Ann. Mo. Bot. Gdn. 1949 : 36 : 355-404.

Part I of this paper, contributed by C. R. Stonor, gives ethnological information on the hill tribes of Assam and details of the varieties grown, methods of cultivation and uses of maize among the different tribes. The data collected point to a long history of maize cultivation in this region; most probably cultivation of this crop antedated that of rice.

In part II, contributed by E. Anderson, the results of a morphological survey of the maize varieties grown by the tribes are presented. A number of well-differentiated varieties are cultivated, typified by the following unusual characters: slight or no plant colour, many short internodes, semi-included tassels, spathe-like upper leaves, pendent tassel branches, several small ears, long slender leaves, short silks, dull aleurone colours and small subspherical kernels. In both Assam and sowings of samples in California the varieties exhibit an outstanding lack of vigour. The above complex of characters is unknown in maize in Mexico and Central America. In South America such an aggregate of characters is approached only in some collections from the eastern valleys of South America and in certain primitive popcorns. In prehistoric times, however, varieties with similar cobs and kernels were the only type of maize grown along the west coast of South America for a very long period.

The distribution of these and similar varieties in the orient is reviewed. They are found to be widely though patchily distributed from Persia and Turkestan to Tibet and Hainan, usually among primitive and conservative peoples.

The conclusion is reached that two major movements of maize distribution occurred in Asia: one in early post-Columbian times, which resulted in a Caribbean type in the Philippines and other countries colonized by Europeans; and another earlier one, consisting of the spread of more primitive types in pre-Columbian times.

As a dominant crop maize undoubtedly developed in the New World. As a primitive, relatively unproductive crop, utilized for brewing, popping and in the green condition, maize is almost universally raised among the primitive peoples of central and southeastern Asia. Presumably maize must have either originated in Asia or have been taken there by a trans-Pacific route from the New World in pre-Columbian times. The importance of further work on oriental collections in the elucidation of the origin of maize is stressed.

1010. PORTJANKO, V. F.
(Vernalization of maize).
Priroda (Nature) 1950 : No. 8 : 63-66.

Vernalization experiments with maize in the Ukraine are reported. It was found that the length of the pre-vernalization soaking treatment required by the dent varieties was 48 hours while that needed by the flints was 72 hours. After soaking the seed was vernalized at temperatures between 6° and 8° C. During the treatment most of the seed remained free from bacterial and fungous diseases, the flint varieties showing greater resistance to diseases than the dents.

Trials with Gruševskaja Mestnaja [Local Gruševskaja], Brounkonti Dnepropetrovskii [Dnepropetrovsk Brown County], Risovaja 645 [Rice 645] and Belaja Kremnistaja [White Flint] showed that the plants of all these varieties produced a larger number of ears than the controls when vernalized for 20 days.

Vernalization treatment for 60 days had the most marked effect in shortening growth periods. However, the plants treated for 15 to 20 days had a healthier appearance, and were taller and more productive. Belaja Kremnistaja benefited most from a 15 day vernalization treatment after which it was superior to its control in respect of grain and straw yield, and average length and diameter of the ear. The plants grown from vernalized seed were two days earlier.

The seed of variety Belaja Kremnistaja vernalized for 30, 45 and 50 days was found to give plants bearing ears containing grains with a pink, reddish or yellow tinge.

1011. JONES, M. D. and
BROOKS, J. S.
Effectiveness of distance and border rows in preventing out-crossing in corn.
Tech. Bull. Okla. Agric. Exp. Sta. 1950 : No. T-38 : Pp. 18.

Information on the effectiveness of spatial isolation and border rows in decreasing out-crossing in *Zea Mays* was obtained by determining the amount of outcrossing between two open-pollinated varieties. The percentage of differently developed grain on Honey June ears resulting from fertilization by pollen of Yellow Surcrotter was accepted as a measure of outcrossing in a block of the variety Honey June. Field experiments show that the percentage of outcrossing is related to the distance from the source of contamination, and that the first five adjacent rows act as a barrier.

1012. RHOADES, M. M.
Gene induced mutation of a heritable cytoplasmic factor producing male sterility in maize.
Proc. Nat. Acad. Sci. Wash. 1950 : 36 : 634-35.

The recessive gene *iojap* (*ij*) induces irreversible mutation not only of plastid primordia but also mutation of a second cytoplasmic component concerned with the development of the pollen. The data show that the mutation of the plastid primordia is independent of that of the cytoplasmic factor determining male sterility. The occurrence of partially male sterile plants with diverse percentages of pollen abortion provides evidence of the particulate nature of the cytoplasmic factor for pollen sterility; it is believed that these partially sterile plants arise from egg cells with cytoplasm containing both normal and mutated particles. It is further suggested that the cytoplasmic particles determining male sterility are mitochondria.

1013.
Illinois high protein corn strains, product of 50 years selection.
Crops and Soils 1950 : 3 : No. 3 : p. 21.

Selection of maize for both high and low oil and protein contents has continued at the Illinois Experiment Station for fifty years. The original variety had a mean oil content of

4.7% which has been replaced by 15.36% in Illinois High Oil and 1.01% in Illinois Low Oil. Protein contents of 19.45% in Illinois High Protein and 4.91% in Illinois Low Protein have been achieved from a mean protein content of 10.92% in the original variety. Two generations of reverse selection have indicated that Illinois High Oil, High Protein and Low Protein still have genetic variability but the oil content of Illinois Low Oil has remained stable.

1014. KIESSELBACH, T. A.

The structure and reproduction of corn.

Res. Bull. Neb. Agric. Exp. Sta. 1949 : No. 161 : Pp. 96.

Present knowledge of the structure and reproduction of *Zea Mays* is summarized, with a detailed presentation of floral development, fertilization and embryology, to promote understanding of reproductive processes in connexion with breeding and genetics. The relationships, origin, genetics and breeding of maize are briefly considered.

1015. FERWERDA, F. P.

Veredelingsmethoden gericht op verhoging van de opbrengst en vervroeging van de rijpingstijd bij mais. (**Breeding methods directed towards increasing the yield and accelerating the ripening of maize**).

Landbouwk. Tijdschr., Wageningen 1950 : 62 : 754-60.

Very few of the American varieties provided by FAO ripen early enough in Holland. The most suitable breeding material will probably come from Canada, the northern states of USA and possibly from the high mountains of Central and South America. Quick germination at low temperatures is essential to avoid stagnation of growth during May and June; also a short vegetative period to allow of ripening even in bad years by early October.

1016.

Hybrid maize in Europe.

FAO European Bull. 1950 : No. 3 : 138-40.

An account is given of the chief results of the 1949 trials on hybrid maize for fodder and silage or grain production conducted at over a hundred centres in eighteen countries of Europe and the Near East under the auspices of FAO. The seed samples were supplied by the US Department of Agriculture, agricultural experiment stations and interested seedsmen in the US and Canada. The trials, together with those carried out in 1948, the first year of the programme, have given valuable clues to the adaptation of hybrid maize in many different regions of Europe, and have shown that well-adapted hybrids produce substantially increased yields of grain. In addition to testing, work on the local production of hybrid maize from native varieties and imported foundation stock was begun at several stations.

1017.

India to test maize hybrids.

FAO Bull. 1950 : 5 : No. 2 : p. 9.

It is mentioned that seed of 36 improved strains of hybrid maize, provided by the American Seed Trade Association, has been sent by FAO to 25 experimental stations in India for experimental testing. The total number of countries participating in the FAO hybrid maize programme now comes to 19.

1018. NOVIKOFF, V. A.

Maïs hybrides. (**Hybrid maizes**).

Bull. Serv. Bot. Agron. Tunis. 1950 : No. 18 : 10-16.

The experiments of Grillot on hybrid maize in Morocco (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1767) and of Alabouvette in France (cf. *Plant Breeding Abstracts*, Vol. XIX,

Abst. 2552 and Vol. XXI, Abst. 320) are reviewed and a detailed account is given of how hybrid seed should be produced. The latest results, obtained with Canadian seed supplied to the Agronomic Research Centre at Rabat, showed that with irrigation, yields exceeding the local variety used as a control by as much as 73% could be obtained from some of the Canadian varieties. The highest yields were from varieties only slightly earlier, or a little later, than the control, whereas the very early American maize Wisconsin 275A yielded slightly less than the control. Among the desirable features of the hybrids were absence of tillering and the fact that they suffered much less from attack by moths. While recommending hybrid maize to farmers, it is pointed out that their performance, without irrigation, is still to be tested.

1019. LAUBSCHER, F. X.

Seed mealies.

Fmg S. Afr. 1950 : 25 : 316-20.

The genetical principles and practical procedure of hybrid maize production are explained. An account is given of the programme of hybrid maize breeding being carried out at the Potchefstroom College of Agriculture, with the cooperation of the Maize Industry Control Board. In general, hybrids of inbreds introduced from the United States have given a less satisfactory performance than local standard varieties, although some of the introduced inbreds have given valuable results in combination with local inbreds. Hybrids from the imported lines appear to ripen off too rapidly, causing excessive desiccation and shrinkage in the ears and seed. It is emphasized that it will still be some time before adapted commercial hybrids have been developed. In 1949 a beginning was made with the small scale release of a top cross between an inbred and a standard white dent variety.

1020. SMITH, C. W.,

LYNESS, W. E. and

KIESSELBACH, T. A.

Factors affecting the efficiency of the mechanical corn picker.

Bull. Neb. Agric. Exp. Sta. 1949 : No. 394 : Pp. 32.

From tests made on the Agricultural Experimental Station Farm at Lincoln, it was found that the efficiency of the mechanical corn picker depends, in part, on the adoption of hybrid maize instead of open pollinated varieties. The greater strength of stalk and consequent erectness of hybrid plants at the time of harvest is one of the more important factors affecting efficiency. It should be possible to breed from the existing hybrids new hybrids with low ear dropping and low shelled grain loss. Differences in resistance, among hybrids, to diseases causing lodging or breaking of stalks are mentioned.

1021. BUCHINGER, A.

Maisversuche 1949. (**Maize trials in 1949**).

Bodenkultur, Wien. 1950 : 1. Sonderheft : 80-99.

Extensive tests were carried out with American hybrid maize and Austrian and foreign, ordinary varieties of maize in 12 localities, under Pannonian, Baltic, Mediterranean and Alpine conditions of climate.

The superiority in yield shown by the hybrid maizes best suited to Austrian conditions, when compared with the best Austrian varieties, is not due to heterosis alone but also to the good condition of the American seed.

BARLEY

1022.

Colonial, new barley, proves its superiority in states of southeast.

Crops and Soils 1950 : 3 : No. 2 : p. 25.

Developed from a cross between Davidson and Sunrise at the North Carolina Agricultural Experiment Station, the winter barley Colonial has good yielding capacity, stiff straw and

some resistance to leaf rust, powdery mildew and mosaic. It has given good results in tests in the southeastern USA and has shown less damage by frost than other varieties at several locations in North Carolina during the past winter.

1023.

An outstanding new variety, Harbine barley.

Seed World 1950 : 67 : No. 6 : p. 32.

The new six-rowed winter barley Harbine has been released in Oklahoma. It is highly resistant to lodging and thus particularly suitable for combine harvesting. It has high test weight, good resistance to leaf rust and some resistance to other leaf diseases; it threshes relatively free from beards. Harbine is equal in winter hardiness to Tenkow, a barley widely grown in Oklahoma. The new variety originated as a selection from seed received from the US Department of Agriculture; the seed was derived from a composite cross which included 13 varieties.

1024.

Missouri's new winter barley variety shows up well in early tests.

Crops and Soils 1950 : 3 : No. 2 : p. 28.

A note is given on the winter barley Mo. B-400, a new bearded variety with high yielding capacity, resistance to mildew and local collections of brown loose smut and some resistance to yellowing and spot blotch. The variety matures about five days earlier than Reno and has stiffer straw. In winter hardiness it is about equal to Reno; it does not therefore extend the area of barley cultivation any further north in Missouri.

1025.

YAMAMOTO, S. and

MEKURO, T.

(Barley genes. I. The inheritance of morphological characters).

Seiken Jiho (Biological Report) 1942 : No. 1 : 46-64.

A synopsis in Japanese is given of the genes believed to determine the inheritance of morphological characters in barley.

1026.

TAVČAR, A.

Nasljedivanje rane zrelosti kod ozimog ječma (*Hordeum sativum* Jess.).

(The inheritance of earliness in winter barley, *H. sativum* Jess.).

Poljoprivredna Znanstvena Smotra, Zagreb 1947 : No. 10/11 : 56-64.

At Zagreb vars *distichum* and *polystichum* of *H. trifurcatum* were found to form heads earlier than varieties of the *aristatum* type.

In order to study the inheritance of earliness in barley, crosses were made between six early earing varieties of *H. trifurcatum* with six different varieties of the late earing *aristatum* type. In the F_1 , the early earing of the *trifurcatum* varieties was dominant over the late earing of the *aristatum* varieties. In the F_2 the progeny were of four distinct types: plants of the *trifurcatum* type earing earlier than their *aristatum* parent, plants of the *aristatum* type earing later than their *trifurcatum* parent, *trifurcatum* type plants earing as late as their *aristatum* parent and *aristatum* type plants that were as early as their *trifurcatum* parent. Plants of the first and second types were more numerous than those of the third and fourth types.

Earliness of ear formation was found to depend upon the gene pair $Ea_2 ea_2$, which was located in the same chromosome as Kk for the *trifurcatum* character. There was 20-33% crossing-over between these two genes.

It is concluded that earliness of the *trifurcatum* type can be combined with the *aristatum* type. This combination has economic importance for Yugoslavia's arid regions.

1027. KUMP, M.
Nasljedivanje duljine vlati kod ječma *Hordeum sativum* Jess. (**The inheritance of straw length in barley, *H. sativum* Jess.**).
Poljoprivredna Znanstvena Smotra, Zagreb 1947 : No. 10/11 : 36-48.

The naked barley genotypes *H. coeleste* and *H. himalayense* in the collection of the Plant Breeding Department of the University of Zagreb were found to have shorter straw than the genotypes of hulled barley, *H. distichum*, which were obtained as a result of hybridization. This observation led to the study of correlations between the genes for straw length and the genes for naked seed. For this purpose straw length was investigated in the F_1 and the F_2 from a cross between a tall strawed hulled barley and a short strawed naked barley, the combinations being M 166 x č 15, M 165 x č 9 and M 333 x č 14.

The length of the straw in the F_1 was nearly the same as that of the hulled parent and, hence, tall straw is regarded as a dominant character. In the F_2 the plants segregated for straw length in the ratio 3 : 1. The analysis of the F_2 for the seed and straw characters investigated showed that there was no dihybrid segregation in the expected ratios 9 : 3 : 3 : 1. The characters of straw length and hulled or naked seed were found to be linked with a cross over value of 10.73%.

1028. SUETSUGU, I.
(**On the sterility affecting barley in the southwestern districts of Japan in 1946.**)
Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 55-57.

Partially or completely sterile ears were observed in barley stands in southwestern Japan in 1946. Winter barleys were more affected than spring barleys; the variety Golden Melon was particularly badly affected. The sterility was associated with abnormally high spring temperature and rainfall.

1029. YAMAMOTO, K.
(**Investigations on germination in the ear in Japanese barley varieties (summary).**)
Proc. Crop Sci. Soc. Japan 1946 : 16 : Nos. 1, 2 : 110-16.

Data are provided on the extent to which 207 Japanese barley varieties germinate in the ear, and on the time at which this occurs. The provenance of the barleys is also given.

1030. KUPERMAN, F. M.
(**Inducing experimentally directed changes in the ear of barley on the basis of an analysis of its phasic development.**)
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 5 : 11-22.

Experiments conducted at Zvenigorod, Moscow province, in which the two-rowed barley Viner, *Hordeum distichum* var. *nutans* was induced to produce multirowed ears and the multirowed variety Červonec [Gold Coin], *H. vulgare* var. *pallidum*, was induced to develop two-rowed ears, are described. The results were obtained by the study of the light and temperature requirements of the two varieties during different phases of their development and by modifying them in such a manner that in the case of Viner the phasic development was retarded and in the case of Červonec stimulated.

The phasic analysis of Viner showed that it has a long vernalization phase which can be hastened by 4-5 days. In order to pass through the light phase Viner requires a 16 to an 18 hour day and temperatures between 12° and 14° C. It appears that the variety can pass the phase under conditions of a somewhat shorter day and that it passes it more quickly when the temperatures are over 14° C and below 25° C. Viner plants developed normally when they were planted in May, but irregularities in the development of the ears were observed in plants sown in July, August and September. Microscopic analyses of the embryonic

ears of these plants showed that the earlier developing spikelets located in the middle of the ears had fully developed florets, but were checked in their further development. This was because the plants could not pass through the light phase under the shorter day conditions. The abnormal conditions resulted in corresponding changes in the normally underdeveloped spikelets located at the basal end of the ear. The three spikelets at the basal end developed uniformly.

Thus most plants sown in July bore ears with underdeveloped spikelets at the distal and abnormal multirowed spikelets at the basal end of the ear and normal spikelets which were characteristic of Viner in the middle of the ear. In several instances there were more than three spikelets developed on the rachis at the basal end of the ear.

Plants planted in August and September showed a still more drastic change from two-rowed to multirowed barley, for the ears produced by them had the multirowed character of the spikelets at their distal as well as at the basal ends and in many plants also in the middle of the ear. It is stated that by exposing these plants to long day conditions in the glasshouse, which enabled them to pass through the light phase and subsequent phases, they were made to produce ears of the multirowed type. The effect of varied light intensity and types of fertilizers upon the later development of the plants is pointed out, some plants obtained in the experiments resembling *H. vulgare* var. *pyramidatum*, others var. *intermedium* and others still var. *pallidum*. In all instances ample illumination and nitrogenous fertilizers intensified the growth of the pistils. Incidentally, this phenomenon was also observed in two-rowed barleys, in which it almost invariably resulted in the development of the naked seed character.

The change of Červonec into a two rowed barley was obtained under laboratory conditions. The plants were treated with temperatures $+10^{\circ}$ and $+12^{\circ}$ C during germination and the light phase and were then given, as soon as they began to differentiate their primordial ears, 17 hour day treatment at 25° C and over. Some Červonec plants thus obtained were two-rowed barleys, others resembled two-rowed barleys more closely than multirowed barleys.

The experiments and a survey of the existing varieties of cultivated barleys suggest that most winter barleys, which are sown in autumn and pass through the second and later phases of development under conditions of short day in autumn and early spring, will be multirowed.

An account of the breeding work with barleys at the Harjkov Breeding Station is given. The natural conditions in the Harjkov province are shown to be more favourable to the development of two-rowed barley varieties including *Europaeum* 353/133, derived from the local variety *Moločnyĭ* 133 [Milk 133], and the varieties *Nutans* 8/71 and *Jubileinyĭ* [Jubilee].

1031. TAKAHASHI, R.
(Studies on the classification and the geographical distribution of barley varieties. III. Inheritance of coleoptile length and its significance for breeding).
 Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 44-47.

The brachytic Uzu [Eddy] barleys are differentiated from normal types by the recessive gene *uz*, while lax eared barleys are distinguished from dense eared forms by the dominant gene *L*. These two genes also affect coleoptile and culm length, but dominance in respect of these two characters is not complete. The usefulness of coleoptile length as an indicator of subsequent adult characters is pointed out.

1032. BERGAL, P.
Identification of barleys.
 Brew. Guild J. 1950 : 36 : 372-80.

Characteristics of use in the identification of barley varieties are discussed. Considered in conjunction with other characteristics of the grain, examination of the lodicules is a highly valuable feature for the purpose of classification. Varieties with large lodicules and

varieties with small lodicules have been termed by the author *Latisquamosae* and *Parvisquamosae* respectively.

1033. TAKAHASHI, R.
Studies on the classification and the geographical distribution of the Japanese barley varieties. I. Significance of the bimodal curve of the coleoptile length.
Ber. Ohara Inst. 1942 : 9 : 71-90.

This article is an extended version in English of that already summarized in Abst. 332.

1034. SANDEGREN, E.
Evaluation of malting barley by chemical analysis.
Rev. Int. Brass. Malt. 1949-50 : 128-29. [from J. Inst. Brew. 1950 : 57 : p. 383].

Tests on the varieties Kenia and Heimdal at three localities in Sweden support the theory that the higher the β -amylase/salt-soluble nitrogen ratio, the greater the proportion of albumin to globulin, and therefore the better the brewing value of the barley.

1035. HORNE, F. R.
Summary of methods used for testing new varieties of malting barley in certain European countries.
J. Inst. Brew. 1950 : 57 : 302-04.

An account is given of research organizations dealing with the development of malting barley varieties in Great Britain, Sweden, Switzerland, Belgium, France and Holland, methods of conducting field trials, and the facilities available for technical study of the crops produced and for the dissemination of information concerning the new varieties.

1036. **European Brewery Convention Congress—Lucerne, 1949. Part II. Report of the Barley Committee.**
J. Inst. Brew. 1950 : 56 : 245-48.
Veldhuizen, H. van Introduction. (p. 245).

In a brief introduction it is emphasized that the contributions that follow form a valuable summary of world research devoted to the production of barley for brewing.

Thunaeus, H. Breeding and industrial testing of malting barley in Sweden. (p. 246).

Swedish work on malting barley is reviewed.

Veldhuizen, H. van Malting barley culture in Holland, Belgium and France. (p. 245).

Barley variety testing and other activities carried out by the National Comité voor Brouwergerst (National Committee for Brewing Barley) in Holland, the Vereniging voor Brouwerij-Onderzoek en Onderwijs (Society for Brewing Research and Instruction) in Belgium and the [Société d'Encouragement de la Culture des Orges de Brasserie et des Houblons en France (French Society for Encouraging the Growth of Barley and Hops for Brewing)] are surveyed.

Veldhuizen, H. van Malting barley in the United States of America. (p. 246).

Six-rowed barleys for brewing are being produced in the USA by selection of local varieties and by hybridization; marked progress has been achieved in breeding for disease resistance. Reference is made to the Mid-West Barley Improvement Association founded in 1945.

Thunaeus, H.

Production and breeding of malting barley in Central Europe. (p. 246).

A brief historical account is given. An analysis of recent results shows that Haisa and Isaria are the most highly graded varieties.

Bendixen, T.

Norwegian malting barley. (p. 246).

Improvement of six-rowed indigenous barley, begun in Norway in 1920, has resulted in the varieties Maskin and Herse. In 1929 the Association of Norwegian Breweries initiated brewing trials of indigenous and introduced barleys.

Vestergaard, E.

Cultivation and breeding of barley in Denmark. (p. 247).

An historical outline of breeding work on malting barley in Denmark is presented. Mention is made of varieties recently developed at the Abed Plant Breeding Station and Carlsberg Breweries, Nordgaard.

Bishop, L. R.

Barley research in Great Britain. (p. 246).

A summary of recent research on dormancy in barley was included in the original paper.

Hunter, H.

The objectives and general results of malting barley investigation in the British Isles, 1901-1948. (pp. 246-47).

Work on the improvement of malting barley in the British Isles since the beginning of the century receives an historical survey.

1037. RIDDLE, O. C. and

BRIGGS, F. N.

Inheritance of resistance to scald in barley.

Hilgardia 1950 : 20 : No. 2 : 19-27.

Inheritance of reaction to scald (*Rhynchosporium Secalis*) was analysed in crosses involving the resistant barley varieties La Mesita, Calif. 1311, Trebi and Turk, and the susceptible variety Atlas. La Mesita differs from Atlas by a single dominant or nearly dominant gene for scald resistance. Trebi and Calif. 1311 each possess a dominant gene designated *A* and a recessive gene *b* for resistance to the disease. It is assumed that the gene *A* in an F_3 plant results in type 0 reaction, and that the recessive gene pair *bb* imparts resistance but permits a range of infection of types 0 to 4, with the majority of plants in groups 1 to 3. The resistance of Calif. 1311 may have originated from Trebi, since the latter variety was one of the parents of the composite cross which gave rise to Calif. 1311. The dominant gene in both varieties is identical with that in La Mesita. The barley Turk possesses the highest degree of resistance so far discovered. Lines giving clear cut monohybrid ratios of 3 resistant to 1 susceptible plant have been secured in the F_2 of Turk x Atlas. All these lines were found to have the same dominant gene for resistance. Some evidence has however been obtained from extensive studies of the F_2 and F_4 generations of Turk x Atlas that one or more additional genes for scald resistance are present in Turk. The single gene occurring in Turk appears to be identical with the dominant gene in La Mesita, Calif. 1311 and Trebi. But Turk and its derivatives have been completely resistant in the field, whereas the other three varieties may show a moderate degree of infection. Three explanations of this behaviour are possible: (1) the group consisting of Turk and its derivatives may have different modifiers from the group comprising Calif. 1311, Trebi and La Mesita; (2) two closely linked genes may account for scald resistance; or (3) multiple alleles may exist.

1038. SUNESON, C. A.

Physiologic and genetic studies with the stripe disease in barley.

Hilgardia 1950 : 20 : No. 2 : 29-36.

Male sterility and its accompanying open flowers have made possible a technique of floral inoculation with spores of *Helminthosporium gramineum* (cf. *Plant Breeding Abstracts*, Vol.

XII, Abst. 1077). The method is applicable to the F_1 from crosses with a male sterile form, back crosses to male sterile plants and to segregates of crosses and back crosses expressing male sterility.

Evidence of two distinct races of the fungus has been obtained.

Conclusive data on the genetics of resistance to stripe have been secured. Hannchen, Trebi, Club Mariout and the male sterile type show dominance of resistance, partial dominance of resistance, dominance of susceptibility and weak resistance, respectively. At least six genes appear to be involved in the stripe reaction of these four barleys.

1039.

Forsøg med bygsorter 1943-1948. (**Trials with barley varieties 1943-48**).

Tidsskr. Planteavl 1950 : 53 : 719-22.

Results of trials of Danish and Swedish barleys at nine experiment stations in Denmark are recorded. Pajbjerg Drot [Pajbjerg King] outwardly resembles Maja, from which it is derived, but it has not such stiff straw. In some places it gave 0.6 hkg. more grain than Maja.

1040.

WILTEN, W. and

KORTENHORST, A. TH.

Verslag van de zomergerst proefvelden in 1948 en 1949. (**Report on the spring barley experimental plots in 1948 and 1949**).

Meded. Nat. Com. Brouwergerst 1950 : 372-450.

This report, which is divided into two parts, contains detailed information on: (1) comparative variety field trials held by the National Comité voor Brouwergerst [National Committee on Malting Barley] in various localities in Holland during 1948 and 1949; and (2) the results of malting quality determinations on samples from the Dutch, Scandinavian and French varieties tested.

The methods and conditions of testing are described. The results are fully set out with graphs and tables with headings and legends in Dutch, French and English and ample summaries in these languages are also provided.

1041.

Société d'Encouragement de la Culture des Orges de Brasserie et des Houblons en France. SECOBRAH. Rapports sur la campagne 1948. (**Society for the Promotion of the Cultivation of Malting Barleys and of Hops in France. SECOBRAH. Reports on the 1948 season**).

Paris 1948 : Pp. 63.

This progress report (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 955) presented in the form of graphs and tables shows details of the performance of winter and spring barleys in various types of trials in many districts of France. The data relate mainly to vegetation studies and nitrogen manuring experiments.

MILLETS AND SORGHUM

1042.

GOVANDE, G. K.

New strains of pulses and millets in Baroda State.

Indian Fmg 1950 : 11 : 153-54.

The following promising strains have been developed: kodra (*Paspalum scrobiculatum*), Baroda 8, Baroda 15 and Vyara 31; bauto (*Eleusine coracana*), Jagudan 44; moth (*Phaseolus aconitifolius*), Baleswar 12 and Medhi 33; guar (*Cyamopsis psoralioides*), Malosan 40; and tur (*Cajanus indicus*), Dehgam 36 and Vijapur 49. The new strains show improvements in yield over the local ones and are to undergo extensive trial in cultivators' plots.

1043. KISHIMOTO, E.
(The origin and history of *Setaria*, *Panicum*, *Echinochloa* and *Sorghum* millets).
Jap. J. Genet. 1941 : 17 : 310-21.

A review is given of the origin, distribution and evolutionary history of cultivated plants belonging to the genera *Sorghum*, *Setaria*, *Panicum*, *Echinochloa*, *Pennisetum*, *Eleusine*, *Eragrostis*, *Coix* and *Phalaris*.

1044. KRISHNASWAMY, N.,
RAMAN, V. S. and
MADHAVAMENON, P.
Abnormal meiosis in *Pennisetum typhoides*. I. Desynapsis.
Proc. Indian Acad. Sci. 1949 : 30 : 195-206.

When the seed of *Pennisetum typhoides* were subjected to X-rays, one offspring (X-161) produced proliferating panicles with 98.5% sterility. This sterility was traced to desynapsis. A detailed study of meiosis gave evidence of conjugation at pachytene in one or two pairs, but by early diplotene, chromosome separation was complete, and the stages following exhibited random segregation, resulting in sterility.

1045. VARENICA, E. T.
(The cultivation of *Setaria* and a botanical and biological description of it).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 5 : 49-53.

This paper forms part of a joint report compiled by several Soviet writers who have studied the cultivation of *Setaria* in northern China and Manchuria. It contains descriptions of the varieties and forms grown for their grain and accounts of the selection work and varietal trials conducted in China.

The Chinese varieties are divided into three groups in respect of earliness with the growth periods of 70-100 days, 101-120 days, and 121-140 days, respectively.

Notes on the cultivated Chinese forms of *Setaria* include a reference to long awned varieties which are more resistant to shedding than varieties bearing awnless or short awned panicles. The variety Tsy-jat (Ch'uyat) [Spiky] appears to escape damage by sparrows because of its well developed awns.

Trials of local varieties of *Setaria* conducted at Peiping established that some biotypes were resistant or near-resistant to *Sclerospora graminicola* and *Ustilago Crameri*. The results suggest that selection of *Setaria* for productiveness and resistance to diseases shows promise. Most Chinese varieties are mixed populations in which some botanical variety remarkable for its specific economic properties is predominant, but as a result of continuous mass selection for good panicle characters they show a marked degree of uniformity.

In trials of 14 Chinese land varieties conducted at the Kungchuling research station, Manchuria, the variety Bodiczu (Potitzū) [Moderate in Requirement] did best. It yielded 27.15 c. grain per ha. and 44.23 c. straw per ha. The varieties Dalihuan (Talihuang) [Yellow Large Grained] and Gao-daovei (Kaotaowei) [Long Knife] yielded 10% less grain but Dalihuan produced nearly as much straw as Bodiczu. The varieties Dabai (Dapai) [Large White], Hunnjanj (Hungnien) [Red Glutinous] and Dacinmjaojapočë (Tach'ing-miaoyap'och'ë) [Large Green Able to Break a Cart] yielded 13% to 20% less grain than Bodiczu, while the remaining eight varieties were even less productive, their yields being between 28% and 47% less than that of the variety heading the list. The less productive varieties included the early northern Manchurian variety Beiman (Weimang) 106 and several varieties originating from more southern districts.

Mičurinite methods to be used in selection work in the USSR with the material introduced from China are outlined.

1046. FRANZKE, C. J.
Norghum, an early combine grain sorghum.
Bull. S. Dak. Agric. Exp. Sta. 1949 : No. 397 : Pp. 4.

Further details of the early, high yielding grain sorghum Norghum, suitable for combine harvesting, are provided (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1656). The variety was selected at the South Dakota Agricultural Experiment Station from the cross (Dwarf Feterita x Dwarf Freed) x Yellow Kafir; the latter parent originated from Pink Kafir x Dwarf Yellow Milo.

1047. HUBBARD, J. E.,
HALL, H. H. and
EARLE, F. R.
Composition of the component parts of the sorghum kernel.
Cereal Chem. 1950 : 27 : 415-20.

Determinations of the amount of endosperm, germ and bran were made, and these fractions were analysed for ash, protein, oil, starch and five of the B vitamins. The varieties chosen for analysis comprised the waxy sorghum Cody, Pink Kafir, and the yellow milos Westland, Midland and Martin. Vitamin content varied much more among varieties than did the proportion of major chemical constituents.

1048.
Pop-sorghum gaining popularity on the farm and with candy makers.
Crops and Soils 1950 : 3 : No. 1 : p. 26.

Pop-sorghum, developed at the Texas Agricultural Experiment Station from a cross between Petite mil from Haiti and Indian shallu, possesses a hull thinner and more tender than that of popcorn. The new form has possibilities for the confectionery trade and manufacture of puffed breakfast cereal. A small amount of seed was recently released to seedsmen for increase and distribution; no further seed is available at the present time.

1049. WADSWORTH, D. F. and
SIEGLINGER, J. B.
Charcoal rot of sorghum.
Bull. Okla Agric. Exp. Sta. 1950 : No. B-355 : Pp. 7.

Sorghum varieties have been studied for their resistance to charcoal rot (*Macrophomina Phaseoli*) during the past few years at two substations of the Oklahoma Agricultural Experiment Station. Atlas Sorgo 899, Sumac 1712 and five other varieties showed no charcoal rot infection during the period of observation; three other varieties exhibited a high degree of resistance. Breeding combine types of grain sorghum resistant to the disease is in progress.

RICE

1050.
Hybrid rice breeding program launched.
FAO Bull. 1950 : 5 : No. 2 : 2-3.

An account is given of the hybridization project initiated by FAO in cooperation with interested countries, with the aim of improving the rice crop of southeastern Asia and other rice producing countries. The project involves the crossing of varieties of the *indica* and *japonica* groups, to be carried out by the Central Rice Research Institute of India at

Cuttack. First and second generation seed will be distributed by the Institute to the other rice breeding stations participating in the scheme so that selection can be based upon the particular needs of the different countries.

1051.

**International Rice Commission. Report of the Second Session
Rangoon, Burma, 6-11 February, 1950.**
FAO, Thailand 1950 : Pp. 46.

A survey of general topics at the conference included rice production, storage, processing, nutritional aspects, internal distribution, statistics and terminology. The encouraging nature of attempts to obtain superior hybrids from varieties of the *indica* and *japonica* groups was emphasized.

The report of the Rice Breeders' Working Party, as an appendix, lists the characters which are limiting present yields. Strains resistant to *Piricularia Oryzae* have been obtained in India by hybridization, although the prevalence of this disease is thought to be connected solely with the use of nitrogenous fertilizers. There is an indication that stocks with resistance to the stem borer have been discovered in South China but no breeding has yet been attempted. Some of the early maturing Japanese varieties consistently produce high yields; this tends to contradict suggestions of genetic correlation between high yields and late maturity, and may lead to the production of more early maturing varieties.

Breeding experiments are to be directed towards obtaining varieties resistant to lodging and shattering, with tolerance of saline soils, flooding and drought, with wider range of adaptation to facilitate distribution and with desired milling and nutritive qualities.

1052.

NAKAYAMA, K.
[Coleoptile growth and growth substances in an hereditary dwarf
rice plant (preliminary note)].
Jap. J. Genet. 1941 : 17 : 156-64.

The amount of growth substance in the apical 2 mm. of the coleoptile of dwarf rice of the genotype *aaBB* equalled that of normal *AABB* plants at the beginning of growth, was later surpassed by the normal, and on the sixth day again equalled the normal. Differential growth responses of the two types to heteroauxin are indicated.

1053.

NAGAMATSU, T.
(Studies on the geographical differentiation of cultivated rice.
V. Classification according to earing date and geographical
distribution).
Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 81-84.

Approximately 2000 varieties from numerous sources were compared for earing date when grown at Fukuoka (Japan). The results are presented according to provenance. The earlier varieties came from higher latitudes and *vice versa*.

1054.

SAITO, K.
(Studies on the rice plant in the delta region of the Yangtsekiang.
VI. On the maturation period and reaction to warmth of the
principal semiglutinous rice varieties of the rice field region to
the south of the river).
Proc. Crop Sci. Soc. Japan 1948 : 17 : No. 1 : 1-3.

Information is given on the earing date of 38 rice varieties, mainly semiglutinous rices, planted out at three different stages of development, either from open air nurseries or from under glass.

1055. MORIMOTO, I.
[Studies on the yielding abilities of the rice varieties in Japan (continued). On the classification of rice according to earing date in relation to distribution in the different prefectures and metropolitan districts].
Proc. Crop. Sci. Soc. Japan 1948 : 17 : No. 1 : 31-34.

Graphs are presented to show the percentage of rice varieties earing on any particular date in the various prefectures and metropolitan districts of Japan. With each degree of latitude further north, the earing date is retarded by about 3-08 days.

1056. MORIMOTO, I.
[Studies on the yielding efficiency of rice varieties in Japan (continued). On earing date].
Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 159-64.

Graphs are given of the percentage of varieties earing each day during 1931-40. The curves are unimodal but markedly asymmetrical, the right limb being much steeper. Early earing is positively correlated with number of stems and negatively correlated with length of stem and yield.

1057. CAPINPIN, J. M. and
AMABA, R. M.
Morphology and heredity of caryopsis characters in Inangel rice.
Philipp. Agric. 1949 : 33 : 51-62.

A study was made of the inheritance of certain characters in the F_1 of the cross between Inangel and Fortuna. The character of "wings" in empty glumes of Inangel showed dominance over its absence. The grains of the F_1 hybrids were intermediate in breadth between those of the two parents. The length of the F_1 grains exceeded that of the grains of either parent; this increase is ascribed to heterosis. The black pericarp of Inangel was dominant over the white pericarp of Fortuna; but the starchy endosperm of Fortuna was dominant over the glutinous endosperm of Inangel. The F_1 kernels germinated earlier than those of either parent and the F_1 plants matured earlier than their parents.

1058. HAMADA, H.
(Considerations on the origin of rice cultivation).
Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 106-07.

Data are provided on the length of the growing point of cultivated Asiatic rice varieties. Since rice attains its widest taxonomic differentiation in southeastern Asia, especially Indochina, the latter is regarded as the probable place of origin of rice cultivation. It is believed that rice cultivation began among people speaking an Austroasiatic tongue and dates from the early neolithic era.

1059. PORTÈRES, R.
Les races de riz à paddy glabre dans les centres de variation secondaire des Guyanes et des Iles Philippines (*Oryza sativa* L.). (The races of rice with glabrous husks in the secondary centres of variation in the Guianas and the Philippines (*O. sativa* L.).
Agron. Trop. 1950 : 5 : 528-32.

The Guianas are regarded as a secondary centre of variation of rice in view of the occurrence there of smooth grained paddy rices. The same characteristic has been discovered in rice varieties in the Philippines.

The author proposes a revision of the Linnean species *O. sativa* by the inclusion of a *nuda* series, by his definition, with husks that are glabrous and without tubercules. Ten glabrous races in the Philippines are separately described and the possible relations between varieties

of *O. sativa* in the Guianas and the Philippines are briefly mentioned. Provisionally, the writer suggests that most of the glabrous varieties found in the Guianas constitute a new secondary centre of variation, partly derivative from the Philippine centre. *O. glaberrima* is now recorded by the author as having been long present in the Guianas, though he had previously erroneously referred the material examined to *O. sativa*.

1060. SHIMAZAKI, Y.

(Cytological studies on the sterility of rice caused by cold water).

Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 89-92.

Cold irrigation water causes sterility in rice. An investigation of the pollen of affected plants revealed the following aberrations: delayed meiosis, asynapsis, laggards, irregular chromosome movements, and hypertrophy of the tapetal cells.

1061. ITO, S.

(Varietal differences in the resistance of rice to potassium nitrate and in catalase activity).

Proc. Crop Sci. Soc. Japan 1946 : 16 : Nos. 1, 2 : 89-93.

Rice varieties were compared in respect of resistance to KNO_3 , catalase activity and promptness of germination. Late germinating varieties were more resistant to KNO_3 . Resistance to KNO_3 was correlated with catalase activity. Semiglutinous varieties tended to have greater catalase activity than glutinous varieties.

1062. WADA, K.

(On the influence of low temperature on the germination of rice seed originating from different localities).

Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 38-39.

Round grained rices germinate better at 15° C. than long grained rices. Among the latter, varieties derived from India were the worst.

1063. VILLAMIL, G. F.

Observaciones preliminares sobre la hora de florecencia del arroz.

(Preliminary observations on the flowering time of rice).

Not. Agron. Palmira 1950 : 3 : 145-49.

Data are given on the flowering times of five rice varieties at Palmira (Colombia). The varieties in general flowered about noon.

1064. SAITO, K.

(Studies on the rice plant in the delta region of the Yangtsekiang.

IV. On partial sterility in what are thought to be spontaneous hybrids of semiglutinous and non-glutinous rice).

Proc. Crop Sci. Soc. Japan 1946 : 16 : Nos. 1-2 : 103-09.

Some late developing but vigorous, partially sterile offtype rice plants are thought to represent spontaneous hybrids between semiglutinous and non-glutinous rices.

1065. CAPINPIN, J. M. and

VILLAMAYOR, F. B.

On clonal reproduction of rice.

Philipp. Agric. 1948 : 31 : 185-91.

In experiments on the rice variety Macan Pina, asexual propagation by tillers detached from mother plants 7 to 15 days after their appearance was possible. Detachment of

tillers from the mother plants in the booting stage caused death of the mother plants. The correlation between the number of bearing culms produced by the mother plant and that developed by the progeny was positive and highly significant. No morphological or developmental variations accompanying tiller propagation were observed. The method may be used for the establishment of pure breeding strains in breeding and genetical work.

1066. MORIMOTO, I.
[Studies on the yielding abilities on the rice varieties in Japan (continued). On the variation in culm length throughout the entire country].
 Proc. Crop Sci. Soc. Japan 1948 : 17 : No. 1 : 41-42.

Figures are given for the culm length of a series of Japanese rice varieties, and the nature of the statistical variation that this character shows is elucidated. Correlation coefficients, none high, are worked out between culm length and other morphological and physiological characters.

1067. KASAHARA, Y.
[On the characteristics of rice with partially two-chambered ovaries (supplement) and its heredity].
 Proc. Crop Sci. Soc. Japan 1948 : 16 : No. 3-4 : 54-57.

The partially bilocular ovary of the Japanese variety Akaho [Red Ear] is described. An examination of the F_2 generation of a cross between this variety and a normal variety showed that the aberrant condition is determined by two recessive genes.

1068. KONDO, M. and
 KASAHARA, Y.
 Feststellung der Sortenechtheit von enthülsten Reiskörnern. I. Phenolfuchsinfärbung. **(The determination of the varietal authenticity of shelled rice. I. Phenol fuchsin staining).**
 Ber. Ohara Inst. 1943 : 9 : 117-20.

The staining reaction to phenol fuchsin A and phenol fuchsin B of 269 and 118 Japanese rice varieties respectively is tabulated.

1069. KONDO, M. and
 KASAHARA, Y.
 Feststellung der Sortenechtheit von enthülsten Reiskörnern. II. Phenol- und Paracresolfärbung. **(The determination of the varietal authenticity of shelled rice. II. Phenol and p-cresol staining).**
 Ber. Ohara Inst. 1943 : 9 : 121-28.

The staining reaction of 196 rice varieties to phenol and to p-cresol was investigated. Japanese and Korean irrigated rices did not usually show a staining reaction, though some irrigated rices from elsewhere did. Upland and glutinous rice varieties usually showed a staining reaction.

1070. KONDO, M. and
 KASAHARA, Y.
 Feststellung der Sortenechtheit von enthülsten Reiskörnern. III. Jodjodkalifärbung. **(The determination of the varietal authenticity of shelled rice. III. Staining with a solution of iodine in potassium iodide).**
 Ber. Ohara Inst. 1943 : 9 : 129-33.

Rice varieties maintained at the Ohara Institute were treated with iodine dissolved in potassium iodide solution. Twelve groups of ordinary varieties and four groups of glutinous varieties were differentiated on the basis of staining reaction.

1071. KONDO, M. and
KASAHARA, Y.
Feststellung der Sortenechtheit von enthülsten Reiskörnern. IV.
Alkaliprüfung und Schluss. (**The determination of the varietal
authenticity of shelled rice. IV. The alkali test and conclusions**).
Ber. Ohara Inst. 1943 : 9 : 134-40.

Rice varieties grown at the Ohara Institute are classified into three groups according to the degree of disintegration observed when their grains were treated with KOH.

1072. KONDO, M. and
KASAHARA, Y.
Alkaliprüfung der polierten Weissreiskörner. (**The alkali test on
polished white rice grains**).
Ber. Ohara Inst. 1943 : 9 : 141-50.

Grains from Japanese varieties disintegrated more readily when treated with KOH than grains from elsewhere (mainly Siam). This difference was correlated with the readier disintegration of the starch grains of the Japanese varieties when treated with KOH and the looser texture of their endosperm.

1073. BAPTIST, N. G.
**Amino-acid analysis of cereal protein—the nitrogen and threonine
contents of Ceylon cereals.**
Trop. Agriculturist 1950 : 106 : 3-6.

The nitrogen and protein contents of the grain of six local rice varieties, and varieties of sorghum and millet have been estimated. Although there were wide variations in protein content, no significant differences were observed in the content of threonine.

1074. WADA, K.
**(Investigations on non-glutinous rice. II. On the distensibility
of its starch grains).**
Proc. Crop Sci. Soc. Japan 1946 : 16 : Nos. 1-2 : 9-11.

Japanese rice and Chinese semiglutinous rice varieties have readily distensible starch grains in contrast to most Chinese non-glutinous rices. Type C however of Chinese non-glutinous rice has somewhat distensible grains.

1075. MORIMOTO, I.
**[Studies on the yielding abilities of the rice varieties in Japan
(continued)].**
Proc. Crop Sci. Soc. Japan 1948 : 17 : No. 1 : 17-20.

A graph is presented to show the strong positive correlation existing between earing date and thermal requirement in the rice varieties grown in the different regions of Japan.

1076. CHATTERJEE, D.
A modified key and enumeration of the species of *Oryza* Linn.
Indian J. Agric. Sci. 1948 : 18 : 185-92.

A modification of the generic description of *Oryza* based upon morphological analysis of the spikelet, and a key to the species of *Oryza* representing a modification of the classification of Roschevicz [Roževič] are given. The history of rice cultivation is discussed from the philological angle. The paper concludes with a list of synonyms for the different species of *Oryza*.

1077. PIACCO, R.
L'attività sementiera nel campo risicolo. Problemi e difesa. (**Seed production activities in the rice field. Problems and counter-measures**).
Riscoltura, Vercelli 1950 : 38 : 183-87.

Rice seed requirements in Italy, seed production methods, and the sale of seed form the main subjects of this paper, in which the formation of the Vercelli Association of Rice Seed Breeders is also announced. The creation of similar associations for other provinces is urged.

1078. S., R.
Trial of Russian rice in India.
Indian Fmg 1950 : 11 : p. 124.

Information is given on the performance of the Russian rice Krasnodar in Madras, Uttar Pradesh, West Bengal, and other regions. The variety was said to grow on dry steppes, ripen a month earlier than ordinary varieties and require no water before harvesting. The variety was not found to be of immediate value but possibly it may be of use in hybridization on account of its early maturity.

1079. MORIMOTO, I. and
FUJIWARA, H.
(**An illustration of varietal comparison by means of yield analysis**).
Proc. Crop Sci. Soc. Japan 1948 : 17 : No. 1 : 43-45.

The performance of two Japanese rice varieties is compared by analysis of the following components: number of individual plants, number of ears per plant, weight of ears, number of grains, and number of roots.

1080.
The U.S.S.R. builds for peace.
Soviet News 1951 : No. 2462 : p. 3.

Mention is made of a new rice variety, produced by the application of Mičurinite methods by a Ukrainian collective farmer. The variety grows satisfactorily without irrigation; in preliminary tests it has equalled irrigated rice in yield. It is expected that the new variety will make possible an expansion of the area of rice cultivation.

1081. KONDO, Y.
(**Studies on the resistance of rice varieties to low temperature injury and on methods for assessing it. VI. Varietal differences in the injury to growth caused by the flow of cold irrigation water**).
Proc. Crop Sci. Soc. Japan 1949 : 17 : No. 4 : p. 3.

Varietal differences in injury to rice by cold irrigation water are noted.

1082. KONDO, Y.
(**Studies on the resistance of rice varieties to low temperature injury and on methods for assessing it. IX. On the resistance of rice varieties to injury caused by low temperature and on the breeding of varieties resistant to injury caused by low temperature**).
Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 165-68.

It is shown, with reference to 21 Japanese varieties, that resistance to injury from cold weather and resistance to injury from cold irrigation water are closely correlated.

Resistance to cold and to blast are however independent, and neither of these qualities appear to be correlated either with yield or earliness. It should therefore be possible to breed high yielding, cold and blast resistant varieties. Irrigation with cold water is regarded as a satisfactory method for determining cold resistance, and late sowing and transplanting is recommended as a satisfactory method for ascertaining blast resistance.

1083.

Rice production in Australia.

Trop. Agriculturist 1950 : 106 : 82-84.

High yields are due partly to the use of high quality seed of Caloro 11 and Late Caloro varieties. Several hybrid forms combining the yields of Caloro varieties with improved grain quality and greater straw strength have been obtained.

1084. SAITO, K.

(Studies on the rice plant in the delta region of the Yangtsekiang. III. Varietal differences in the susceptibility to blast of Japanese, Chinese and Indian rice following late sowing under unirrigated conditions).

Proc. Crop Sci. Soc. Japan 1946 : 16 : Nos. 1-2 : 94-102.

A series of 83 varieties were compared for the incidence of blast consequent upon late sowing. The most susceptible varieties were Chinese semiglutinous and Japanese upland varieties. Japanese irrigated varieties and Taiwan upland varieties were moderately susceptible, while Chinese non-glutinous varieties, Taiwan irrigated rices, and Indian varieties were little affected.

1085. KONDO, Y. and

IGARASHI, K.

(Studies on the resistance of rice varieties to low temperature injury and on methods for assessing it. VIII. Intervarietal differences in the injury caused by low temperature and blast due to late sowing and transplanting).

Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 69-70.

In unfavourable seasons, varietal differences become apparent in the susceptibility to blast of rice that has been sown and transplanted late, and hence has been exposed to abnormally low temperatures during the development of the panicle.

1086. CAMPACCI, C. A.

A "queimadura do arroz". (Rice blast).

Biológico, S. Paulo 1950 : 16 : 128-30.

The resistance of the variety Zenith to *Piricularia Oryzae* is noted during a discussion of the incidence of this disease in South America.

1087.

Études agronomiques sur le riz au Soudan Français. (Agronomic studies on rice in the French Sudan).

Agron. Trop. 1950 : 5 : 339-65.

Descriptive notes are given on the most popular rices of the French Sudan: Sornavari, Dissi-N-14, Sikasso B, Sikasso H and Bentoubala B. At the Kayo Station selection to maintain their varietal qualities and purity is carried on. Their performance in trials with other varieties and hybrids from various sources is recorded in tables with observations on yields, factory qualities and commercial value.

Some new crosses have been made which may, it is hoped, ultimately give hybrids combining yields like those of Sikasso B and H, Bentoubala, Dissi and Sornavari with the grain qualities of varieties such as Java, Trinidad and Nira.

1088. CAPINPIN, J. M. and
YÑIGUEZ, T. M.
**Behavior of five Brazilian rice varieties under lowland culture
in the College of Agriculture.**
Philipp. Agric. 1950 : 33 : 166-89.

The results of varietal trials using Brazilian varieties at Los Baños, Laguna, showed that under local methods of cultivation the variety Dourado Agulha [Golden Needle] flowered and matured before any others and produced the highest percentage of filled grains, the longest grains and the heaviest weight of grains per individual. The second most promising variety was Pérola [Pearl] which produced the heaviest weight of grain per panicle and the highest number of bearing culms in a hill.

1089. CALMA, V. C. and
PAGUIO, M. D.
The performance of five varieties of lowland rice.
Philipp. Agric. 1948 : 31 : 298-304.

Information is given on the degree of lodging and susceptibility to pests and diseases, plant height, number of bearing culms per hill, age of flowering and maturity, yield and milling percentage of the varieties Quezon, Raminad 2, Seraup Kechil 36, Consejala and Thailand in tests carried out at the College of Agriculture, Laguna, Philippines.

1090. CAPINPIN, J. M. and
MIGUEL, G. B.
**Analytical studies of Rexoro, Nira and Iola rice varieties grown
in the College of Agriculture.**
Philipp. Agric. 1949 : 32 : 223-30.

A report is given of a study of the tillering capacity, grain and other characters of the American rice varieties Rexoro, Nira and Iola, grown at the College of Agriculture, Laguna, Philippines. From the commercial point of view Rexoro is considered the best variety.

1091. FAJARDO, P. S.
**The performance of three Federated Malay States rice com-
pared with Raminad.**
Philipp. Agric. 1949 : 32 : 252-56.

The varieties Seraup Kechil 646, Seraup Kechil 36 and Seraup Besar 15 were compared with Raminad as regards yield and other characters in a trial under lowland conditions at the College of Agriculture, Laguna, Philippines.

1092. OCFEMIA, R. H. and
CALMA, V. C.
**The performance of three varieties of rice when planted late in
the season.**
Philipp. Agric. 1948 : 31 : 206-11.

A study was made of the performance of the varieties Seraup Kechil 36, Apostol and Inintiw when transplanted after the usual season of August to the first week of September, at the College of Agriculture, Laguna, Philippines. The results suggest that if rice is planted late in the season, Seraup Kechil 36 should be preferred to either Apostol or Inintiw.

FORAGE GRASSES

1093. CORKILL, L.
Pedigree strains of pasture plants.
 Grasslands Bull. 1950 : No. 3 : Pp. 15.
 Pedigree strains of perennial, Italian and short rotation rye grass, cocksfoot, timothy and white and red clover in New Zealand are described.
1094. JENKIN, T. J.
Grass. The breeding and development of pedigree grasses, by the Director of the Welsh Plant Breeding Station.
 Brit. Racehorse 1950 : Pp. vii.
 An illustrated account is given of grass improvement work carried out at the Welsh Plant Breeding Station, Aberystwyth, since the establishment of the station in 1919.
1095. SUSLOV, A. F.
(Artificial supplementary fertilization of forage grasses grown for seed).
 Sovetskaja Agronomija (Soviet Agronomy) 1950 : No. 4 : 47-54.
 The effect of supplementary fertilization upon the yields of timothy, fescue, rye grass, cocksfoot, brome, *Alopecurus pratensis* and *Digraphis arundinacea* was studied at the USSR Scientific Research Institute for Forage Crops. It was found that the seed from the apical ends of the inflorescences was superior to the seed from the basal ends.
1096. SKALIŃSKA, M.
Studies in chromosome numbers of Polish angiosperms.
 Acta Soc. Bot. Polon. 1949-50 : 20 : 45-68.
 Species for which chromosome numbers additional to those already reported in the literature are given include *Poa alpina* var. *vivipara*, $2n = 22, 23, 28$ or 35 , and *Festuca ovina*, var. *vivipara*, $2n = 35$. The chromosome number of *Poa granitica* ($2n = c. 80$) is reported for the first time.
1097. WEISS, M. G. and
 MUKERJI, S. K.
Effect of planting method and nitrogen fertilization on relative performance of orchardgrass strains.
 Agron. J. 1950 : 42 : 555-59.
 The effect of planting method on the relative performance of eight cocksfoot strains was investigated at the Iowa Agricultural Experiment Station. The planting methods comprised: (1) 3 foot drill rows, (2) 1 foot drill rows, (3) broadcast sowing alone, (4) sowing with lucerne in alternate 1 foot drill rows, (5) broadcast sowing with lucerne and (6) broadcast sowing with birdsfoot trefoil. The accuracy of methods (1) to (4) was judged by comparing the results from these methods with the performance of the strains in the broadcast sowings with legumes. Method (3) was found to be the most satisfactory of the first four techniques. The effect of nitrogen fertilization on the relative performance of eight cocksfoot strains was analysed in (1) 3 foot rows, (2) 1 foot rows and (3) broadcast plots. No appreciable interaction occurred between strains and nitrogen level with regard to forage yield, panicle production or nitrogen content of the forage.
1098. ELLERSTRÖM, S. and
 TJIO, J. H.
Note on the chromosomes of *Phleum echinatum*.
 Bot. Notiser 1950 : No. 4 : 463-65.
Ph. echinatum has a chromosome number of $2n = 10$, in contrast to all the other species of *Phleum* so far known which belong to a series with a basic number of $x = 7$. Information

is given on the morphology of the chromosomes of *Ph. echinatum*. The idiogram of the chromosomes of this species differs from that found in the more common species of *Phleum*; no support can be given for supposing that types with $x = 7$ have been derived from this type with $x = 5$ by duplication of two chromosome pairs. Another feature of interest in *Ph. echinatum* is the presence of one chromosome pair, the smallest of the complement, possessing terminal centromeres.

1099.

Two outstanding new brome-grass varieties released by Nebraska.

Crops and Soils 1950 : 3 : No. 3 : p. 23.

Two new varieties of brome-grass, Lancaster and Lyon, have been released after 12 years of selection and testing by the Nebraska Crop Improvement Association. Lancaster is recommended for fertile soils or in irrigated areas; Lyon thrives well on non-irrigated, sloping upland soils. Both the new varieties exceed the forage and seed yields of all other established varieties.

1100.

Two new bromes.

Seed World 1950 : 67 : No. 6 : p. 41.

The new brome-grass selections Lyon (Nebr. 36) and Lancaster (Nebr. 44) are being released by the Nebraska Agricultural Experiment Station. Lyon is an aggressive type recommended for planting on sloping lands and non-irrigated soils; it is superior to Lincoln in both forage and seed production. Lancaster is a fine stemmed leafy strain recommended for fertile soils and irrigated conditions. It produces forage of outstandingly good quality, and has outyielded all other varieties in forage and seed production in tests at the Nebraska Station.

1101. PICKETT, R. C.

Variability of crude protein and carotene contents and their relations with other characters in brome-grass, *Bromus inermis* Leyss.

Agron. J. 1950 : 42 : 550-54.

Variability in crude protein content, carotene content, yield, colour, and certain morphological characters was analysed in spaced plants of 175 lines from 25 unrelated first generation inbred families. First generation inbreds were chosen for study in order to compare the amount of any variation due to segregation through inbreeding with the variation occurring between unrelated lines. The characteristics of the top growth were studied during the second and third years after transplanting, mainly at the stage of early pasture, i.e. at the time of maximum vegetative growth before rapid stem elongation. In the second year, variations in the yield among plants were significant in 11 of the 25 families analysed. Differences between the yields of families were highly significant. The differences in yield of individual plants within several families were as great as the differences among unrelated families. Carotene content varied significantly among plants in 6 of the 17 families analysed at the early pasture stage in the third year of growth. Differences in carotene content between families proved to be highly significant. A high positive correlation was found between carotene content at the early pasture stage and colour and protein content at the same stage. Protein content at the early pasture stage varied within most of the families investigated in both the second and third years of growth. Highly significant differences in protein content occurred between families in both years at the early pasture stage. Protein contents at the early pasture stages of the second and third years were correlated with a value of +.89. The same relationship at anthesis was less than half as close. This result suggests that comparisons intended to detect differences in the inheritance of protein content may be made more profitably at young growth stages. Negative correlations of vigour, leafiness and yield with protein content at the early pasture

stage were obtained, but these do not present an insoluble dilemma to the breeder, since several individual families were average or above the average as regards yield, yet had high protein content. Selection of plants with high protein content by using a morphological character did not appear to be of any real practical value since none of the characters studied was correlated with protein content to a sufficiently high degree. Direct testing of lines for protein content during early growth stages is proposed.

1102. BEETLE, A. A.

Buffalograss—native of the shortgrass plains.

Bull. Wyo. Agric. Exp. Sta. 1950 : No. 293 : Pp. 31.

A general account mentions that newly developed strains of *Buchloe dactyloides* include Hays, which produces superior yields of seed held high off the ground.

1103.

Texas agronomists develop new sorghum for feed and forage.

Crops and Soils 1950 : 3 : No. 2 : p. 25.

Hi-Hegari, a new sorghum developed primarily for forage and silage, was recently released to certified seed growers by the Texas Agricultural Experiment Station. The new variety is similar to Hegari in forage quality, maturity and adaptation, but yields about 20% more forage.

1104. NIXON, W. M. and

WEBSTER, C. B.

King Ranch bluestem . . . new range grass.

Crops and Soils 1950 : 3 : No. 1 : 10-12.

King Ranch bluestem, a strain of *Andropogon ischaemum* collected from a ranch in Texas, is giving promising results as a pasture grass in Texas, Oklahoma and other states. In trials at the Soil Conservation Service Nursery, San Antonio, Tex., the grass has proved to be outstanding in vigour, palatability, seed production, aggressiveness and ability to survive.

1105. OKE, J. G.

Bulk emasculation technique as applied to *Dichanthium annulatum* Stapf.

Sci. and Cult. 1950 : 16 : 30-31.

D. annulatum and *D. caricosum* both have $2n = 40$ chromosomes. The former species may be emasculated without harming the ovaries by hot water treatment of the panicles at 47° C. for five minutes.

1106.

Tall wheatgrass is now certified by Nebraska group.

Crops and Soils 1950 : 3 : No. 3 : p. 23.

An improved variety, Tall wheat grass well adapted to wet, alkaline soils, which was obtained from the selection FPI 98526, has been certified by the Nebraska Crop Improvement Association.

1107. SWALLEN, J. R. and

ROGLER, G. A.

The status of crested wheatgrass.

Agron. J. 1950 : 42 : p. 571.

Two "varieties" of crested wheatgrass, Standard and Fairway, are grown commercially in the United States. A great diversity of forms has been noted within the variety Standard.

Recently, a study of plants grown at experimental stations of the US Department of Agriculture has revealed that two species enter into the composition of Standard, *Agropyron cristatum* with horizontally spreading spikelets, and *A. desertorum* with appressed spikelets. At present all plants of Fairway are classed as *A. cristatum*. Chromosome numbers of $2n = 28$ and $2n = 14$ have been reported for Standard and Fairway respectively. Attempts to hybridize these two types have been unsuccessful. All the evidence therefore emphasizes the need for a separate classification of the two varieties. Standard consists primarily of *A. desertorum*; the common name crested wheatgrass is therefore misleading, but since the name is so widely accepted its continued use for both pure *A. desertorum* and for mixtures of *A. cristatum* and *A. desertorum* is advised, at least for the present.

LEGUMINOUS FORAGE PLANTS

1108.

Talent, new alfalfa resists nematodes and yields well in Oregon.

Crops and Soils 1951 : 3 : No. 4 : p. 27.

Talent, a new lucerne variety, which begins growing early in spring and continues to grow vigorously, providing an extra cutting each season in comparison with standard varieties, has been developed at the Southern Oregon Branch Experiment Station (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2178). The plants are very hardy, grow densely enough to exclude most weeds and are highly tolerant of the stem nematode.

1109. JULÉN, G.

Vad kan väntas av vallväxter med höjt kromosomtal? (What can be expected from herbage plants with a high chromosome number?)

Lantmannen 1950 : 34 : 987-89.

In a review of the work that has been done on the production of polyploid crop plants, it is pointed out that though practical results with timothy, white clover, and lucerne have been poor so far, promising varieties of Alsike, e.g. Tetra and Sv 0205, and red clover have been bred and may soon be expected on the market. In addition to the red clover Sv 034 (cf. Abst. 871) mention is made of promising strains of red clovers which are being bred at the Västergötland, Östergötland and Ultuna branch stations of the Swedish Seed Association and are resistant to clover stem eelworm. Some Norrland red clovers, especially Offer, seem likely to yield strains that can compete with diploids under Norrland conditions.

The difficulty of overcoming low seed production and deficient vigour in polyploids is briefly discussed.

1110. PEDERSEN, M. W. and

BOHART, G. E.

Using bumblebees in cages as pollinators for small seed plots.

Agron. J. 1950 : 42 : p. 523.

Notes are given on the use of bumble bee species to secure a high level of pollination in cages for the production of sufficient seed in lucerne breeding and testing. The method should be applicable to other crops.

1111. GRABER, L. F.

A century of alfalfa culture in America.

Crops and Soils 1950 : 3 : No. 3 : 10-13, 29, 34; also Agron. J. 1950 : 42 : 525-33.

The development of the lucerne crop during the past 100 years is reviewed, with emphasis on breeding for winter hardiness in the future.

1112. LANG, R.
Alfalfa variety trials in Wyoming.
 Bull. Wyo. Agric. Exp. Sta. 1950 : No. 297 : Pp. 11.

Results of varietal trials for high yields and wilt resistance are given in detail.

1113. JONES, L. G.,
 BRIGGS, F. N. and
 BLANCHARD, R. A.
Inheritance of resistance to the pea aphid in alfalfa hybrids.
 Hilgardia 1950 : 20 : No. 2 : 9-17.

A study was made of the inheritance of resistance to the pea aphid (*Macrosiphum pisi*) in crosses between a resistant plant derived from the lucerne Common Chilean and a susceptible plant of the same variety. The efficiency of methods of testing for resistance is analysed. The procedure of caging one second instar nymph with each plant gave a fairly accurate classification of F_3 families. F_3 data indicated the presence of a recessive gene for resistance and at least one dominant gene for resistance. In addition, the data suggested that linkage exists between the two genes, with a cross-over value of 28%. Progress has been made in breeding an aphid resistant lucerne of the Common Chilean type.

1114. TJURDENEV, A. P.
(The wild Pečora red clover).
 Sovetskaja Agronomija (Soviet Agronomy) 1950 : No. 6 : 80-84.

The results of trials in northern Russia and Siberia of a wild red clover collected on the Pečora river are reported. The clover shows promise both as breeding material and for immediate cultivation in some northern parts of the USSR including the Komi Autonomous Republic.

The clover proved highly productive, hardy, early and resistant to damage by spring flooding, and to diseases.

1115. SERGEEV, P. A.
(Increasing the reliability and extent of yields in the red clover used in field rotations).
 Sovetskaja Agronomija (Soviet Agronomy) 1950 : No. 8 : 72-82.

The productiveness of red clovers in the USSR is shown to depend on their growth and adaptability to local climatic conditions. Single cut, late maturing clovers of which Jaroslavskii [Jaroslavl], Srednerusskii [Central Russian] and Marusinskii 150 [Marusino 150] are mentioned, proved hardier and hence more productive in the Rjazanj, Tula, Orel, Kursk, Ivanovskaja, Vladimir and Moscow provinces. Laboratory trials at the Institute for Fodder Crops in which different clovers were exposed to low temperatures established that single cut and two cut varieties differed within each group in their degree of hardiness according to their place of origin. The clovers from Siberia, the Urals and Perm showed the greatest resistance to cold.

Selection and reproduction of adaptable ancient land varieties are advocated. In this connexion local varieties in the Bobruisk province are mentioned. These proved hardier and more productive than clovers introduced to the province from Canada, just as the local Vologda clovers Čerepoveckii, Prišeksinski and Vesjegovskii were hardier and yielded 10 to 13% more hay in the Vologda province than varieties introduced from Perm, Kirov and Jaroslavl.

1116. EKSTRAND, H.
 Skadorna på de övervintrande grödorna vintern 1948-49. **(Damage to the over-wintering crops in the winter of 1948-49).**
 Växtskyddsnotiser 1950 : No. 1 : 6-11.

Mention is made of the resistance of the Norrland strain of Offer clover to clover rot at Flahult Experimental Farm and in other clover strain trials in the Småland highlands. Merkur and Resistentia showed poor resistance.

1117.

Klövernematoden och dess bekämpande genom resistensförädling.
(**The clover nematode and its control by breeding for resistance**).
Medd. Stat. Trädgårdsförsök 1950 : No. 58 : p. 77.

The high yielding, nematode resistant strains of red clover obtained by selection from local southern Swedish clovers have not proved winter hardy enough for central and northern Sweden. It was therefore necessary to breed for a combination of winter hardiness and nematode resistance. In the course of this work it has proved possible to carry out a preliminary selection at the seedling stage after infection of the very young plants. It has also been found that the main difference between susceptible and resistant strains is that in the former the parasite reproduces itself very rapidly, while in the latter reproduction is inhibited in a high degree.

At the Ultuna Branch Station of the Swedish Seed Association a resistant and winter hardy tetraploid strain of red clover has given good results in tests.

1118.

NOLIN, W. T.

**It's evergreen. A new clover that reseeds, gives hot season
pasturage and rivals Ladino in growth.**
Sth. Seedsman 1950 : 13 : No. 11 : 15, 55.

The white clover Louisiana Improved, developed by W. T. Nolin, Hamburg, La., possesses the capacity to reseed and to withstand dry weather and heavy grazing. The strain has given good results not only in Louisiana, but also in South Carolina, Georgia and Alabama. Breeding work is being continued to obtain a strain with further improvements.

1119.

NAKAYAMA, K.

(**Hereditary abnormal division of leaflets in *Trifolium pratense*
quinquefolium de Vries**).
Jap. J. Genet. 1941 : 17 : 231-42.

A review of investigations into the hereditary basis of extra leaflet production in *T. pratense* is given in Japanese.

1120.

AHLGREN, G. H. and

FUELLEMAN, R. F.

Ladino clover.

Advanc. Agron. 1950 : 2 : 207-32.

A review is given of information on the history, distribution, characteristics, adaptation, establishment, management and utilization of Ladino clover (*Trifolium repens*), a crop of growing interest in the United States. No specific investigations on the breeding and genetics of this clover have been reported; but probably Ladino clover is similar to white clover in most phases of breeding and genetical behaviour.

1121.

FUGA, A.

(**Winter vetch**).

Sovetskaja Agronomija (Soviet Agronomy) 1950 : No. 8 : 45-49.

Breeding *Vicia villosa*, particularly for its use as a hardy winter forage plant, is advocated. The study of the winter vetch is to include collections of wild forms.

1122.

WATSON, E. R.

Vetch cultivation in the wheatbelt.

J. Dep. Agric. W. Aust. 1950 : 27 : 259-63.

A number of strains of vetch from the Hawkesbury Agricultural College New South Wales, have undergone tests for adaptation to the wheat belt area; P 4059 was chosen for its promising yield, erect habit and palatability. It is immune to attacks by the pea weevil

and highly resistant to the red legged earth mite. Chemical analyses have shown that it has high nutritive value with an insignificant content of cyanogenic glucosides.

1123. WHITE, G. H.
***Lespedeza* spreads northward again.**
 Crops and Soils 1951 : 3 : No. 4 : 12-13.

Three new early varieties of the Korean *Lespedeza bicolor*, Iowa 6, 39 and 48, have been developed at the Iowa Agricultural Experiment Station which will extend the growing range of *Lespedeza* 75 miles further north (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 266).

1124. CHEVALIER, A.
 Le développement de la culture du lupin doux en Allemagne occidentale.
 (The development of the cultivation of the sweet lupin in Western Germany).
 Rev. Bot. Appl. 1950 : 30 : 528-29.

A brief account is given of the research that has been done in Germany on sweet lupins and of their characteristics and uses.

1125. FEDOTOV, V. S.
 (The questions of the cultivation of the lupin with low alkaloid content and of seradella).
 Sovetskaja Agronomija (Soviet Agronomy) 1950 : No. 8 : 50-59.

In post-war trials conducted at the Tiraĩenskaja Research Station, Latvian SSR, sweet lupins proved more productive than local and selected varieties of bitter lupins. The following varieties with low alkaloid contents gave good yields of seed or hay: Kormovoĩ Tiraĩenskĩĩ [Fodder Tiraĩenskĩĩ], a yellow variety with varicoloured seed; Kormovoĩ 1 [Fodder 1], a yellow white seeded lupin; Jubileĩnyĩ [Jubilee], a yellow seeded variety; and Kormovoĩ 2, a narrow leaved blue lupin variety.

1126. Sortsforsøg med Lupiner 1946-49. (Variety trials with lupins 1946-49).
 Tidsskr. Frøavl 1950 : 19 : 375-77.

Averages for 4-year trials of lupins are tabulated, showing seed yield and protein production per ha., protein content, percentage of bitter seeds and 1000 seed weight for varieties grown for a ripe crop, while for varieties grown to be harvested green the yield of green fodder and dry matter and also the crude protein content are given. The material tested comprised Weiko, the Pajbjerg strains 515, 471, 481 and 302 and the varieties Reform and Sødulpin DLF [Sweet lupin DLF].

1127. PAUL, A. K. and
 DATTA, R. M.
 The chromosome number and the development of the embryo-sac in *Crotalaria intermedia* Kotschy.
 Sci. and Cult. 1950 : 15 : 280-81.

C. intermedia has $n = 8$ chromosomes. The mode of development of the embryo sac is described.

1128. WARMKE, H. E.
 "Mayaguez hairless"—a mutant of tropical kudzu.
 Agron. J. 1950 : 42 : 571-73.

A hairless mutant of *Pueraria phaseoloides*, recessive to the normal hairy form, has been found in Puerto Rico. The F_1 hybrids between hairless and hairy plants are intermediate

in hairiness, and are now being selfed and back-crossed to the parental types to elucidate the genetical basis of absence of hairs. The mutant form may be more palatable to livestock. No evidence has so far been obtained that it is less hardy and productive, or less resistant to diseases and insects than the normal hairy plants.

ROOTS AND TUBERS

1129. JÄHNL, G.

Bericht über die Tätigkeit der Bundesanstalt für alpine Landwirtschaft in Admont im Jahre 1948. F. Das Referat für Hack- und Ölfrüchte. (**Report on the work of the Federal Institute for Alpine Agriculture in Admont in the year 1948. F. The report on root and oil crops**).

Veröff. Bundesanst. alp. Landw. Admont 1950 : No. 3 : 40-56.

Variety tests for yield and performance were carried out with potatoes, sugar beet, poppy, mustard and sunflowers, observations being also made of morphological and physiological characteristics, e.g. the development of dehiscent and indehiscent types of poppy capsule. Three varieties of flax were studied as regards yield of seed and oil.

Tables of results for 27 varieties of potatoes include data on starch content, diseases of tuber and haulm and the characteristics of sprouts induced in light. The sunflower trials included a new variety 2004 and two Ukrainian varieties, the latter two proving superior in yield, early ripening and size of heads. One of the Ukrainian varieties, Ždanovskii, showed a higher oil content than the other two varieties. The variety 2004 had a higher protein content than either of the others.

1130. GRAF, A.

Futtermübenversuche. (**Fodder beet trials**).

Bodenkultur, Wien 1950 : 1. Sonderheft : 135-37.

Four varieties from the Austrian breeding register and two Danish varieties were tested, the yields of leaves, roots and dry matter and the sugar contents being determined. The variety Rosa Beta was the best in all respects, except that it was not as easy to harvest as the red and the yellow Eckendorfer types.

1131. MIZUSHIMA, U.

Studies on some auto- and allopolyploids made in *Brassica*, *Sinapis*, *Eruca* and *Raphanus*.

Agric. and Hort. Japan 1944 : 19 : 743-44. [from *Heredity* 1950 : 4 : 399-400].

Meiosis in autotetraploids of *Brassica* species bearing the A, B or C genomes, and in *Sinapis* (genome S), *E. sativa* and *R. sativus* (genome R), was found to be quite regular in spite of some quadrivalent formation. Plants with the genome constitutions BBCC, AACC, AAAABB, AAAACC, BBBBCC, AARRRR, AABBC and BBCCSS behaved irregularly at meiosis, but the AABB, AASS and AARR types formed bivalents alone at meiosis I and cell division was regular.

1132. MIZUSHIMA, U.

Some amphidiploids in Cruciferae. I-IV.

Breeding and Hort. 1944 : 2 : 401-04, 441-44, 481-83, 515-16. [from *Heredity* 1950 : 4 : p. 400].

Amphidiploids displaying gigas characteristics were obtained from *Brassica carinata* x *B. campestris*, *B. carinata* x *B. nigra*, *B. Napus* x *B. pekinensis*, *B. Rapa* x *Raphanus sativus*, *R. sativus* x *B. Rapa*, *B. campestris* x *Sinapis arvensis*, *B. Rapa* x *S. arvensis* and *B. carinata* x *S. arvensis*. The amphidiploids, in contrast to the sterile normal hybrids, show varying degrees of fertility. Data are provided on the metaphase configurations of each.

1133. HOSODA, T.
Fertility of colchicine-induced amphidiploids between *Brassica* and *Raphanus*.
 Agric. and Hort. Japan 1946 : 21 : p. 515 [from Heredity 1950 : 4 : p. 400].

A case of low fertility in colchicine induced amphidiploids of *Brassica Rapa* x *Raphanus sativus* is reported.

1134. MUSIL, A. F.
Identification of brassicas by seedling growth or later vegetative stages.
 Circ. U.S. Dep. Agric. 1950 : No. 857 : Pp. 26.

In a previous publication species of *Brassica* were distinguished on the basis of their seedling characteristics (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2300). The present paper describes the seedling characters of species and botanical varieties of *Brassica*; the description and illustrations are based upon the study of 14-day old seedlings grown under ordinary greenhouse conditions during the autumn and winter months at a high temperature range of 55° to 70° F.

1135. BRUNE, W.
 Observações sobre compatibilidade no gênero *Brassica*. (**Observations on compatibility within the genus *Brassica***).
 Ceres, Brasil 1949 : 8 : 158-72.

Interfertility relations were studied between *B. Rapa*, *B. chinensis*, *B. pekinensis*, *B. japonica* and *B. oleracea*. The first three species are fairly interfertile; *B. japonica*, however, does not readily cross with these forms and appears more closely related to *B. oleracea*.

Self fertility was studied in the crosses *B. chinensis* x *B. Rapa* and *B. pekinensis* x *B. Rapa*. The segregations obtained in the F₂ and F₃ suggest that self fertility depends on three dominant genes A, B and C. *B. chinensis* and *B. pekinensis* are thought to carry A and B., *Rapa* to carry B and C.

1136. Forsøg med Stammer af Kaalroer 1946-1949. (**Trials with strains of swedes 1946-49**).
 Tidsskr. Frøavl 1950 : 19 : 335-38.

The performance is recorded of Danish varieties and strains of swedes at nine experimental stations in Denmark. The yield of dry matter and of roots and tops per ha. and the dry matter content of the roots are tabulated and notes are given on the source of seed of some of the varieties and on their individual characteristics. Strains cited for their resistance to club root on infected soil included: Wilhelmsburg Øtofte X and E, the most resistant; and Grønhovedet Hunsballe X [Green-topped Hunsballe X] and Wilhelmsburg Trifolium X, which took second and third place respectively (cf. Abst. 873).

1137. LEŽEPEKOV, S. A.
(New potato varieties at the Uljanov Research Station).
 Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 7 : 73-74.

Reference is made to 11 varieties of potatoes obtained by cross pollination and training at the Uljanov Potato Research Station. Three varieties, which are adapted to the conditions of southeastern Russia, have been made standards.

Uljanovskii [Uljanov] is resistant to drought and gives a good crop when planted in summer. It is early and has good keeping properties. The tubers are white and oval, with a smooth surface and shallow eyes. The flavour is good.

Vyrypaevskii is a drought resistant mid season variety with good keeping properties. It has a high yielding capacity when planted in summer. The tubers are white, oblong and taper at one end. The surface is smooth and the eyes shallow. The flavour is good and the starch content high.

Volžanin [Volga] is a drought resistant mid early variety yielding a good crop when grown in summer. The tubers are large, white and round, with a satisfactory starch content. They have a good flavour and keep well.

1138. MATVEEV, V. P.

(**Agricultural methods for double-cropping varieties of potatoes**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 3 : 62-64.

Potatoes thus designated are varieties, the tubers of which are capable of uniform growth and sprouting, immediately after harvesting. The first such varieties bred or selected in the USSR were obtained at the USSR Institute of Plant Industry. These include Hibiny 3, Hibinskiĭ Skorospelyĭ [Early Hibiny] and Hibinskiĭ Dvuhurožainyi [Double cropping Hibiny]. Hibiny 3 was derived from a cross involving *Solanum Rybinii* var. *boyacense*. Reference is made to other double cropping hybrids obtained from crosses with var. *boyacense* as one parent.

1139. LAZAREVA, A. G.

(**On the role of vegetative rapprochement in interspecific hybridization of potatoes**).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 5 : 39-45.

Evidence obtained in hybridization work at the Institute of Potato Farming at Koronevo with *Solanum Jamesii*, *S. Schickii* f. 11, *S. demissum* f. 0227, *S. Kesselbrenneri* f. 310, *S. Kesselbrenneri* f. K-668, the wart resistant varieties Jubel and Berlichingen, and the very early productive Soviet variety Epron is presented.

The effect of vegetative rapprochement was specific for each variety and each species, depending on the extent of the influence of the mentor and the biological properties of the variety or species. In the case of *S. Schickii* the crosses with Jubel and Berlichingen were made compatible; in the crosses between *S. Kesselbrenneri* and Jubel the cultivated variety became more predominant in inheritance; in the case of *S. Jamesii* the self sterility of the species was overcome, and in *S. demissum* vegetative rapprochement resulted in a higher percentage of offspring of the cultivated type. Vegetative rapprochement had the effect of increasing the production of fruits and of fruits containing seed. Hybridization between *S. Kesselbrenneri* and the varieties Jubel and Berlichingen showed that *S. Kesselbrenneri*, which has hitherto been regarded as incompatible in crosses with *S. tuberosum*, in fact crosses with cultivated varieties with relative ease. Its previous failure to cross is attributed to the absence of a suitable pollinating variety. This may also apply to other species which were found to be incompatible in crosses with cultivated potatoes.

As a result of vegetative rapprochement, hybrids were obtained between the cultivated varieties Jubel and Berlichingen, on the one hand, and *S. Schickii*, *S. Kesselbrenneri* and *S. Jamesii*, on the other. These hybrids and the selfed progeny of *S. Kesselbrenneri* show promise as material for potato breeding. *S. Kesselbrenneri* plants are remarkable for the large number of tubers and stolons they produce.

1140. SWAMINATHAN, M. S.

(**Wild relatives in potato breeding**).

Farming, Norwich 1950 : 4 : 370-73.

Some of the problems of using disease resistant wild potato species for breeding purposes are outlined, and techniques used to promote flowering, to break dormancy and to induce polyploidy are described.

It is often necessary to cause chromosome doubling for various purposes. After doubling the chromosome number of types in which $2n = 24$, e.g. *S. polyadenium*, which is resistant to late blight and the Colorado beetle, they can be crossed with *Solanum tuberosum* ($2n = 48$). By doubling the number of some of the 48 chromosome species which do not easily cross with *S. tuberosum*, crossing may occur more readily with a maternal parent in which $2n = 96$. This has been achieved with *S. acaule*, which is frost resistant, and *S. longipedicellatum* with resistance to blight. To obtain amphidiploids from hybrids which are sterile, such as the hybrid from *S. acaule* ($2n = 48$) and *S. simplicifolium* ($2n = 24$), chromosome doubling has produced highly fertile plants with $2n = 72$.

As forms in which $2n = 48$ are of greatest practical value, efforts are generally made to produce hybrids in which the chromosome number is 48 before attempting to cross them with *S. tuberosum*. The blight resistant species *S. demissum* ($2n = 72$) is now crossed first with a 24 chromosome species, *S. Rybinii*, so that the resulting hybrid, with 48 chromosomes, can be crossed successfully with the cultivated potato.

1141. DODDS, K. S.
Polyhaploids of *Solanum demissum*.
 Nature, Lond. 1950 : 166 : p. 795.

A table is given summarizing the results of using *S. demissum* as maternal parent in crosses with cultivated and wild diploid species of *Solanum* at the Commonwealth Potato Collection, Cambridge. Among the plants produced are two parthenogenetic polyhaploids of *S. demissum*, one with $2n = 36$ and the other with $2n = 39$. Each polyhaploid shows the same reaction to *Phytophthora infestans* as the particular line of *S. demissum* from which it originated. The haploid with $2n = 39$ does not form more bivalents at meiosis than the one with $2n = 36$, in spite of the fact that it must be disomic for the three extra chromosomes. The former shows a range of 3-8 bivalents; thus both plants provide evidence of some intrahaploid homology of their chromosomes.

1142. BAINS, G. S. and
 HOWARD, H. W.
Haploid plants of *Solanum demissum*.
 Nature, Lond. 1950 : 166 : p. 795.

Crossed with cultivated *S. tuberosum* varieties ($2n = 48$), *S. demissum* ($2n = 72$) gives pentaploid hybrids ($2n = 60$) which can be back-crossed to *S. tuberosum*. An alternative method of using *S. demissum* in breeding has been suggested by Black (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1742). This consists of crossing *S. demissum* with a diploid species ($2n = 24$) such as *S. Rybinii* to obtain a tetraploid F_1 hybrid and of then crossing this hybrid with *S. tuberosum*. At the Cambridge Plant Breeding Institute, crosses were made between *S. demissum* and diploid species and between *S. demissum* and *S. tuberosum*, in order to compare the two methods of breeding. In addition to the normal tetraploid F_1 hybrids, plants with chromosome numbers of $2n = 60$ and 36 were produced from the cross *S. demissum* x diploid species. The plants with 60 chromosomes are the result of fertilization by diploid gametes of *S. Rybinii*. Plants with 36 chromosomes correspond to haploid *S. demissum*. Meiosis has been studied in one of the haploids. The haploid form is a polyhaploid, having three sets of 12 chromosomes each. A preliminary examination of 19 cells at metaphase I showed an average frequency of 4.74 bivalents per cell. Attention is drawn to the fact that K. S. Dodds has also obtained haploid plants of *S. demissum* from similar hybridizations (cf. Abst. 1141).

1143. GALUTVA, V. N.
(The effects of the depth of planting and of the variety upon the yield of potatoes).
 Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 2 : 62-64.

Mičurinit selection work with potatoes at the Birjučii Kut Breeding Research Station is reported. Both summer planting and deep sowing resulted in yield increases in all varieties

under trial. The most promising varieties for cultivation in the arid south of the USSR were Seedling 242-261 which was developed at the Uljanov Research Station and improved by training and selection at Birjučii Kut, Seedling 157-3 and Katahdin originating from Siberia.

Seedling 242-261 was particularly productive and resistant to diseases irrespective of whether it was planted in the spring or summer. Its tubers were of good quality and contained 17.7% starch. The variety is being multiplied up on collective farms in the Rostov province. The varieties Seedling 157-3 and Katahdin are being improved prior to their release in the near future.

1144. HEINZE, P. H.
Determining specific uses for different types and varieties of potatoes. Thirty-fifth Annual Proceedings of the Ohio Vegetable and Potato Growers Association 1950 : 135-39.

Testing potato varieties for their suitability for potato crisp making and other uses is discussed.

1145. GARBUZOVA, A. P.
(The inheritance of useful characters by the progeny).
Priroda (Nature) 1949 : No. 7 : 57-59.

In Russian experiments tuber yield and starch content of the potato variety Wohltmann increased as the result of the addition of boron to fertilizer dressings. The changes were heritable. The increases in the tuber yield in the year of treatment and the first, second, third and fourth generations are recorded.

1146. HOOF, H. A. VAN.
Enkele gegevens omtrent productie en gevoeligheid voor *Phytophthora infestans* de Bary in Indonesië van een 26-tal aardappelvariëteiten.
(Some data on the yield and susceptibility to *Ph. infestans* de Bary in Indonesia of some 26 varieties of potatoes).
Landbouw 1950 : 22 : 408-10.

About 26 varieties of potatoes from Holland were tested in the Dutch East Indies for resistance to blight and *Pseudomonas solanacearum*. Few plants were attacked by brown rot, and no differences in susceptibility were noted. Some marked differences in varietal resistance to blight were however evident in the sprayed and unsprayed groups as compared with the standard Eigenheimer, long grown in Java.

The blight resistance figures also differed from those recorded in the 1949 Descriptive Variety List of Crop Plants issued in Holland.

In Indonesia the most promising varieties, Profijt and Gloria, both sprayed and unsprayed, are much more resistant than Eigenheimer to blight and both are resistant, at least in Holland, to crinkle.

1147. DRIVER, C. M.
Breeding new potato varieties.
Agron. Rev. 1949 : 2 : 30-32.

Potato breeding, severely curtailed during the Second World War, has been resumed with the object of developing varieties specially suited to conditions in New Zealand. Blight resistant stocks have been imported from Britain and the USA, for commercial use should they prove resistant to New Zealand strains of the disease, and possibly for future breeding. The problem of producing blight resistant potatoes is to be tackled first; in due course breeding for resistance to virus, scab and other diseases will be undertaken. It is expected that use will be made of wild species from Central and South America; it is however hoped

that disease resistant introductions from other countries will shorten the breeding programme by cutting out some of the early stages of the work entailed in breeding from interspecific hybrids.

1148. EEK, T. VAN and
THUNG, T. H.

Resultaten van onderzoekingen omtrent aardappelziekten op Java.
(**Results of investigations on potato diseases in Java**).
Landbouw 1950 : 22 : 303-46.

The part of this paper dealing with the resistance of various hybrids to bacterial wilt and *Phytophthora* has already been summarized by Thung in 1947 (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 302).

The present paper also discusses methods of control and selection for resistance to wilt, *Phytophthora* and certain virus diseases.

In field experiments 19 varieties and strains of potatoes, including Botergele, Kentang Djawa, Koninkjes, Paul Krüger, Kentang Wulung, M19 and the strains 175-55, 174-29 and 172-18, were more wilt resistant than Bevelander though not sufficiently so to ensure good yields to growers.

Among the wild varieties, the most wilt resistant forms belonged to the species *Solanum andigenum*, *S. Antipoviczii*, *S. Caldasii*, *S. Commersonii* and *S. chacoense*. A laboratory method of testing for resistance by inoculating sprouts with a suspension of the bacterium proved unsatisfactory.

Wild species and hybrids were also examined to find whether there are any leaf roll and virus Y resistant forms that might be used as parents in breeding.

1149. ROSS, H. and
BAERECKE, M. -L.

III. Selection for resistance to mosaic virus (diseases) in wild species and in hybrids of wild species of potatoes.
Amer. Potato J. 1950 : 27 : 275-84.

Work on virus resistance in wild species and interspecific hybrids of *Solanum* carried out at the Max-Planck-Institut für Züchtungsforschung, Germany, is described. Methods of preliminary study of wild species for virus resistance used by Stelzner in the period 1939 to 1943 and methods used in testing wild species and their hybrids during the years 1947-48 are outlined.

One plant of *S. acaule* has been secured which is homozygous for immunity from virus X; other plants of *S. acaule* have given progenies consisting of both immune and susceptible seedlings.

Immunity from virus Y has been found in *S. chacoense*, *S. cordobense*, *S. Garciae*, *S. catharthrum*, *S. Macolae*, *S. ajuscoense*, *S. Antipoviczii* and *S. polyadenium*, and possibly also in *S. demissum*, *S. Chaucha*, *S. Rybinii* and *S. Commersonii*. Immunity from virus A appears to be as general as immunity from Y.

S. chacoense and *S. andigenum* appear to be the only sources of leaf roll immunity. *S. chacoense* is also immune from Y and highly resistant to the Colorado beetle. This species therefore appears to be the most suitable as a starting point for breeding for resistance to beetle and virus immunity. It is pointed out that *S. polyadenium* is also important as a carrier of resistance to *Phytophthora* and an intensifier of resistance to Colorado beetle and immunity from virus Y.

1150. RUDORF, W.
IV. Methods and results of breeding resistant strains of potatoes.
Amer. Potato J. 1950 : 27 : 332-39.

Work carried out at the Max-Planck-Institut für Züchtungsforschung, Germany, on breeding for resistance to late blight, virus diseases, wart and Colorado beetle is surveyed. In using *Solanum demissum* and other species in breeding for late blight resistance, extreme

difficulty has been encountered in selecting commercially promising strains completely resistant to all eight races. It is suspected that resistance to the eight races is polygenically inherited; thus only the production and testing of very large numbers of seedlings from systematic hybridization and back-crossing offered some chance of success. Methods of selection are outlined. Some of the clones resistant to late blight which have not broken down as a result of leaf roll infection may eventually be released as blight resistant varieties. Since early ripening varieties are generally more exposed to late blight than late ripening varieties in certain parts of Europe, increased attention has been given recently to selecting resistant strains of early maturity. Blight resistant strains of *S. ajuscoense*, *S. verrucosum* and *S. Antipoviczii* have also been used in hybridization. The combination of resistance to late blight, virus diseases and Colorado beetle is now being sought in breeding commercial varieties by the use of complex hybrids, of which some details are given.

1151. ŠČERBOVA, A. I.

(The introduction into industry of new potato varieties).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 6 : 57-58.

Reference is made to new Soviet potato varieties showing resistance to wart, *Phytophthora* and drought, including the following: Agronomičeskii [Agronomic], Zvenjevoi [Detachment], Trudovoi [Labour], Zazerskii, Partisan, Kalev, Kungla, Iygeva Piklik [Iygev Piklik], Iygeva Kollane, Virulane, Moskvich [Moscovite], Peredovik [Leading], Bogarnyi [Rain-fed], Severnaja Roza [Northern Rose], Privkuljskii Rannii [Early Privkuljsk], Laima, Igarskii, Podarok Rodine [Gift to Homeland], and Novinka Pustyni [Desert Novelty].

1152.

New highly resistant varieties may stop late blight of potatoes.

Canad. Grain J. 1950 : 6 : No. 3 : p. 23.

A note is given on a recent announcement by the Department of Agriculture, Canada, that certified seed of two new potato varieties with a high degree of late blight resistance, named Canso and Keswick, is available for distribution. In field tests both varieties have compared favourably with Green Mountain as regards yield and quality in most areas.

1153. SCHAAL, W.

New Virginia potato resists late blight and gives high yields.

Crops and Soils 1951 : 3 : No. 4 : p. 28.

A new variety of potato, named Pungo, has been developed at the Virginia Truck Experiment Station, with resistance to *Phytophthora infestans*. Tests have shown that it has outyielded the variety Irish Cobbler in Virginia, maturing at approximately the same time, and has good cooking qualities. It was obtained by selection from the cross 96-44 x 528-170 and has been known previously as B76-43.

1154.

La búsqueda de variedades de patatas resistentes a las enfermedades.

(The search for disease resistant potatoes).

Agricultura, Madrid 1949 : 18 : p. 571.

Three Spanish hybrids, Basabe x Industrie, Sergen x Industrie and Blanca de la torta x Aal Ragis are mentioned as of possible interest in respect of blight resistance.

1155. HOLMBERG, C.

Jämförande fältförsök med tidiga kräft-immuna potatissorter.

(Comparative field trials with early, wart immune varieties of potatoes).

Växtskyddsnotiser 1950 : No. 3 : 38-44.

In creating protected areas against wart disease in Sweden resistant varieties must be found to replace the early, but susceptible, varieties now in cultivation. For this reason

trials here reported were conducted in various districts to test the value of immune varieties, when harvested as an early crop, in comparison with the susceptible Early Puritan and Early Rose.

1156.

Potatiskräftan i Sverige. (**Potato wart in Sweden**).

Flygbl. Växtskyddsanst., Stockh. 1950 : No. 91 : Pp. 8.

A descriptive list is given of the wart immune varieties of potatoes grown in Sweden and growers are urged speedily to replace any susceptible varieties with immune ones, making a total, not a gradual, clearance their aim. Some of the susceptible varieties in general cultivation at present in Sweden are named.

1157. ILJJAŠENKO, N. G.

(**A collective farm noted for high yields of potatoes**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 4 : 76-79.

Reference is made to two productive varieties developed at the Polesje Research Station, a mid-season variety 36 and Sejanec 289 [Seedling 289] which according to preliminary tests is resistant to wart.

1158. LUNDEN, P.

Undersøkelser over reaksjon mot kreft (*Synchytrium endobioticum*) hos potet. [**Investigations on the reaction to wart (*S. endobioticum*) in the potato**].

Meld. Norg. LandbrHøgsk. 1950 : 30 : 1-48.

With the collaboration of Jørstad (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 752), Gulli and Erikstad, results were collected on the resistance or susceptibility of potato varieties to wart disease. The first part of the present paper contains two lists showing: (1) the wart reaction in laboratory tests in Norway from 1939 to 1946; and (2) the results recorded in tests of 350 varieties in various countries as well as Norway from 1919 to 1946. Information is also given on the source from which each variety was obtained.

The second part of the paper records all the results obtained by the author in past and recent experiments on the inheritance of wart resistance (cf. *Plant Breeding Abstracts*, Vol. VII, Abst. 1279 and Vol. XI, Abst. 742). Six tables are appended showing the wart reaction of hybrid progenies from crosses in which one parent was respectively Centifolia, Jubel, Doon Star, Hindenburg, Ås or some other variety.

1159. NIELSEN, L. W.

***Fusarium* seedpiece decay of potatoes in Idaho and its relation to blackleg.**

Res. Bull. Idaho Agric. Exp. Sta. 1949 : No. 15 : Pp. 31.

Data on the relative susceptibility of 14 potato varieties to *Fusarium Solani* and blackleg are included.

1160. Moor, J. C.

Het Fusarium-rot of droogrot bij aardappelen. (***Fusarium* or dry rot of potatoes**).

Landbouwk. Tijdschr., Wageningen 1950 : 62 : 712-24.

Eigenheimer and Bintje are very susceptible to dry rot, but Voran is not and keeps well. Some *S. demissum* hybrids show considerable resistance but no immunity.

1161. AHLBERG, O.

Undersökningar över potatisnematoden *Heterodera rostochiensis* Woll. II. Cystornas storlek och ägginnehåll samt nematodernas beroende av yttre förhållanden och deras inverkan på potatisplantornas knölbildning. (Investigations on the potato root nematode *H. rostochiensis* Woll. II. Size and egg content of the cysts and the dependence of the nematodes upon external conditions and their influence upon tuber formation of potato plants).

Medd. Stat. Växtskyddsanst., Stockh. 1950 : No. 55 : Pp. 56.

The results of five years of research on the varieties Arran Consul, Alpha, Dir. Johannsen, Dunbar Yeoman, Early Puritan, Irish Cobbler, King George V, Majestic and Voran showed that all suffered equally as regards the reduction in yield due to nematode infestation and that no variety was superior to the rest in tolerance of the pest.

Tests of 69 plants of different species indicate that in Sweden potatoes and tobacco are practically the only hosts for the potato root nematode.

1162. PARKS, T. H.

Potato tuber injury by flea beetle larvae. Thirty-fifth Annual Proceedings of the Ohio Vegetable and Potato Growers Association 1950 : 130-35.

There was some correlation in 1949 between injury by flea beetle larvae and the potato variety grown, Cobbler showing more injury than other varieties grown under the same conditions.

1163. ANTIPOVA, L. K.

(Potato resistance to *Epilachna*).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 8 : 34-36.

The results of investigations into potato resistance to *Epilachna vigintioctomaculata* at the Far Eastern Research Station of the USSR Institute of Plant Industry are reported. The plant material included a collection of wild species, multiple interspecific hybrids and cultivated varieties.

A high degree of resistance was observed generally in the wild species *Solanum rionegrinum*, *S. laplatium*, *S. xillense*, *S. Garciae*, *S. Schickii*, *S. demissum* and *S. demissum* vars *orientale* and *tlaxpehualcoense*. In another group of wild species the resistance of some samples was good but others were as susceptible as the cultivated varieties. Plants showing less than 10% injury in this group included four individuals of *S. catharthrum*, three individuals of *S. Molinae*, nine of *S. gibberulosum*, five of *S. Horovitzii* and four of *S. Antipoviczii* var. *Gandarae*. The primitive forms and Chilean samples of *S. tuberosum* showed a high degree of susceptibility to *Epilachna*.

Some late varieties such as Wohltmann, Regina, Sickingen and Condor showed a remarkably quick recovery from leaf injury caused by the pest.

The multiple interspecific hybrids from crosses involving *S. demissum* resistant to *Phytophthora* and Colorado beetle, as one parent and a *S. tuberosum* variety as the other parent, included several which showed a high degree of resistance to *Epilachna* and a capacity for quick recovery from leaf injury. Some productive hybrids were selected.

The experiments suggest that the potato species resistant to Colorado beetle are also resistant to *Epilachna*.

1164. BARBE, J.

Nouveaux procédés biologiques de lutte contre le doryphore. (New biological methods of combating the Colorado beetle).

Rev. Hort., Paris 1948 : 120 : p. 252.

The Polish Ministry of Agriculture in collaboration with the Versailles Agricultural Research Station has organized experiments at Chesnoy (Loiret) on the resistance of *Solanum*

demissum x *S. tuberosum* to Colorado beetle. Both field and laboratory tests are based on the toxic effect of the solanin in the leaves upon the pest. The percentage survival of beetles is estimated and compared with that for the control Ackersegen. The possibilities of using *Cycroma*, *Pchlagium* and the earwig as hyperparasites of the beetle is also to be investigated.

1165. PETERSON, A. G. and
GRANOVSKY, A. A.
Feeding effects of *Empoasca fabae* on a resistant and susceptible variety of potato.
Amer. Potato J. 1950 : 27 : 366-71.

It was observed that under conditions in Minnesota the potato Sequoia, which is relatively resistant to leafhopper, bore populations of leafhopper nearly as large as those occurring in the susceptible variety Irish Cobbler, and also suffered yield reductions due to leafhopper injury as great as those shown by the latter variety. The most conspicuous symptom of infestation in Cobbler was the development of hopper burn; although stunting and curling of the leaflets as well as dwarfing of the plants were observed in Sequoia, very little hopper burn occurred. Investigation of the possible causes of this varietal difference in reaction to the pest suggests that both anatomical and physiological characteristics may be involved.

1166. LADEBURG, R. C.,
LARSON, R. H. and
WALKER, J. C.
Origin, interrelation and properties of ringspot strains of virus X in American potato varieties.
Res. Bull. Univ. Wis. 1950 : No. 165 : Pp. 47.

Results are given of tests correlating severity of symptoms and different strains of the ringspot type of potato virus X, using numerous host varieties. Isolates from infected but apparently healthy varieties are as virulent as those from severely affected ones when inoculated into virus X free potatoes, which remain severely infected in both first and second generations. Isolates from Red Warba decrease in virulence in the third generation. Established varieties are now completely protected by latent virus X. Plants of recent introduction respond to inoculation in either of three ways: (1) virus free plants show severe symptoms; (2) the majority are completely protected by previous infection; and (3) the varieties Chippewa and Sebago are only partially protected. Experiments show that delay in movement of the latent protective virus from the tubers of some varieties causes only partial protection. This becomes complete at later stages.

1167. BJØRNSTAD, A.
Latente potetvirus og deres utbredelse i 18 alminnelig brukte potet-
sorter i Norge. Metoder til å kontrollere dem. I. (**Latent potato
viruses and their incidence in 18 commonly cultivated potato
varieties in Norway. Methods of control. I.**)
Meld. Stat. Frøkontroll Ås 1946-47 (1948) : 43-63. Årsmeld. Stat.
Landbrkjem. Kontrollstasjoner Frøkontroll 1947 (1950). Tillegg E til
Landbruksdirektørens årsmelding 1947.

In this study, carried out in Norway, 18 varieties comprising 2000 apparently healthy plants and 715 showing mild mottle were tested for their virus content. Varietal differences were noted in the percentage of plants without symptoms, and the various stocks of the same variety also showed marked differences in that respect. Only the varieties Ås, King George and Carnea showed virus free plants. It appears that plants showing no symptoms may contain the X virus, mainly mild strains, while plants exhibiting mild mottle carry mainly severe X virus, either alone or with other viruses. By selecting plants without symptoms the Y virus could be eliminated from all the varieties tested except Prestkvern,

and severe X virus could be considerably reduced in some varieties. Plants with severe X virus nearly always show symptoms, but virus free plants may show mild mottle. Figures obtained for the variety Ås suggest that the number of virus free plants increases to a greater extent than would appear from the increase in the number of plants without symptoms. As regards the serological determinations, it was found that X antiserum reacted with all X strains, but showed a higher titer, a wider range of reaction and a more rapid and vigorous reaction with its homologous and most closely related antigen.

1168. OSWALD, J. W.
A strain of the alfalfa-mosaic virus causing vine and tuber necrosis in potato.
 Phytopathology 1950 : 40 : 973-91.

An account is given of a disease first observed in 1946 near Stockton, Calif., causing severe haulm and tuber necrosis in the potato White Rose. The disease is caused by a virus designated tuber necrosis virus, which is considered to be a strain of the lucerne mosaic virus characterized by the ability to cause haulm and tuber necrosis in the potato. The varieties Mohawk, Netted Gem, Pontiac, Chippewa, Teton and Houma all showed susceptibility to the virus upon artificial inoculation.

1169. PERRET, C.
 Le problème actuel de la dégénérescence des pommes de terre. (**The topical problem of the degeneration of potatoes**).
 Rev. Agric., Nouméa 1942 : 4788-96.

In outlining the type of experiments which could be made in selection to eliminate degeneration, the author points out that lines from the same mother plant generally resemble each other and that leaf roll or crinkle are hereditarily transmitted to the progeny of diseased mother plants.

1170. STELZNER, G.
 Virusresistenz der Wildkartoffeln. (**Virus resistance of wild potatoes**).
 Z. Pflanzenz. 1950 : 29 : 135-58.

Tests of wild potatoes belonging to the groups *Commersoniana*, *Tuberosa* s.l. and *Acaulia* revealed no form tolerant or resistant to all the viruses X, Y and A and leaf roll, though tolerance to one or other of these viruses occurred in individual wild forms. Similarly immunity to X and Y probably also occurs separately in individual forms. Several clones of *Solanum chacoense* exhibited complete tolerance to leaf roll. In the *Tuberosa* group forms with 24 and 48 chromosomes showed resistance or tolerance, and in the case of *S. Antipoviczii* and *S. ajuscoense* probably immunity to Y and A, whereas the 72 chromosome forms were particularly susceptible. All the *Tuberosa* forms were susceptible to X and leaf roll. The *S. acaule* clones ranged from moderately to markedly susceptible to A, Y and leaf roll, while to X they were tolerant or immune. *S. Antipoviczii* and *S. ajuscoense* seemed to offer the most promising material from which immune types might possibly be bred. The lines followed in the preliminary stages of the breeding programme are outlined. Possibly the use in future of the serological test might simplify the process of selecting highly resistant material.

1171. TOGARI, Y.
(A breeding technique for the potato involving two seasonal plantings).
 Proc. Crop Sci. Soc. Japan 1949 : 17 : No. 4 : 6-7.

Experiments are reported to show how autumn planting can reduce the incidence of virus disease in potatoes.

1172. SCHMIDT.
Beobachtungen auf einer Hollandreise. (**Observations on a Dutch tour**).
Kartoffelbau, Hamburg 1950 : 1 : 88-89.

A brief account is given of a tour made to study the organization of potato breeding research in Holland.

1173. DEMEL, J.
Kartoffelsortenversuche. (**Potato variety trials**).
Bodenkultur, Wien 1950 : 1. Sonderheft : 99-108.

The results are given of trials at Fuchsenbigl, Grabenegg and Lambach to determine the yields and starch contents of early and late varieties of potatoes. At all three stations the best of the early varieties was Böhms Allerfrüheste Gelbe [Böhm's Earliest Yellow] from Lower Austria, followed by Naglerner Frühgold [Naglern Early Gold] and Böhms Allerfrüheste, both from Upper Austria. Ackersegen from Lower Austria was the best of the late varieties, followed by Aquila, Ostbote [Eastern Messenger] and Voran [Forward], all of which came from Upper Austria.

1174. EDWARDS, G. R.
New potato varieties.
J. Dep. Agric. S. Aust. 1950 : 54 : 74-75.

In a trial at Kalangadoo, South Australia, the varieties Monak and Moona, developed in New South Wales, have given promising results. Stocks of Kennebec, a variety introduced from the USA, will probably shortly be available for distribution.

1175.
Results of potato variety trials.
Mon. Rep. Minist. Agric. N. Ire. 1950 : 25 : 235-38.

Potato variety trials continued at Stormont during 1950 on the same basis as in previous years, their object being to compare the cropping capabilities and suitability of the newer varieties of the Ulster series with older well known varieties. Seedling 1194 has been given the name of Ulster Dale. Developed by J. Clarke, the variety produces white, well-shaped oval tubers. It matures at about the same time as the early main crop varieties but is suitable for digging as a second early for shipping.

1176.
Forsøg med kartoffelsorter 1943-1948. (**Potato variety trials 1943-48**).
Tidsskr. Planteavl 1950 : 53 : 715-18.

Results are tabulated of trials held in various localities on different types of soils in Denmark. As in previous years, Dianella, Tylstrup Odin, Robusta and Tylstrup 34106 gave the best yields among the late varieties for fodder and industrial purposes. Among the second earlies, which included the table varieties Flämingskost, Akebia, Tylstrup 13187 and King Edward, Flämingskost with its smooth, yellow-fleshed tubers ranked first as regards yield. Cooking tests were also made. Akebia, Robusta and Frühbote were the most resistant to leaf roll.

1177. KUWADA, A.
(**On chimeras affecting the root tubers, stems and leaves of the sweet potato**).
Proc. Crop Sci. Soc. Japan 1948 : No. 1 : 54-56.

The various types of chimeras, mainly recognized by differences in anthocyanin pigmentation, affecting the root tubers, shoots and leaves of the sweet potato are described,

and data are given on their frequency of occurrence in several Japanese varieties. A brief discussion follows on the genetic origin of such forms.

1178. KOBAYASHI, M.
[Studies on soya beans grown as an additional crop in sweet potato fields. (2). Varietal differences between sweet potatoes resulting from the influence of soya beans planted in addition].
Proc. Crop Sci. Soc. Japan 1948 : 16 : No. 3-4 : 12-16.

Information is provided on varietal differences in the productivity of sweet potatoes when the latter are interplanted with soya beans.

1179. CALMA, V. C. and
ZAMORA, F. S.
The yield and varietal characters of some varieties of the sweet potato.
Philipp. Agric. 1949 : 32 : 215-22.

Data are given on the yielding capacity, maturity period, susceptibility to pests and other features of 11 sweet potato varieties, studied at the College of Agriculture, Laguna, Philippines.

FIBRES

1180.
Improved cotton plants—and planters.
Soviet News 1950 : No. 2456 : p. 7.

In Uzbekistan a new variety of cotton from which the leaves fall when the crop is mature has been produced by selection. This is an advantage for machine harvesting. Other characters include increased weight of the boll and higher fibre content. Sparse lateral growth allows an increase in the number of plants per acre.

1181. BEDERKER, V. K..
Future cotton growing problems of Hyderabad State.
Indian Cott. Gr. Rev. 1950 : 4 : 79-88.

Low yield of seed cotton and lint per acre constitute the chief problem of cotton growing in Hyderabad. Among the means of overcoming this problem is the breeding of improved varieties. The improved Gaorani varieties (*Gossypium arboreum* var. *neglectum* f. *indicum*) developed so far by single plant selection can be further improved in staple length, ginning outturn, boll size and wilt resistance by hybridization. Suitable parents are available in Gaorani and other types of *G. arboreum*. Fundamental research should also be carried out on the lodging habit of Gaorani 6E-3 and its inheritance, the photoperiodic response in f. *indicum* and the genetics of cottons belonging to this form.

1182. ADAMS, J. E.
Cotton.
Advanc. Agron. 1950 : 2 : 1-80.

The chief aspects of cotton production in the United States, including breeding, are surveyed by various authors.

1183.
New cotton announced by originators of Deltapine varieties.
Crops and Soils 1950 : 3 : No. 2 : p. 25.

The variety Fox is being released by the Delta and Pine Land Company, Scott, Miss., originators of the Deltapine cottons. Fox is earlier in fruiting than Deltapine; it is $1\frac{1}{32}$ in.

shorter in the staple and lacks the very high lint percentage of Deltapine but has given high yields of seed cotton. It also has thicker fibre than most varieties with similar fibre length.

1184.

Arkot 2-1, the new Arkansas cotton.

Rep. Ser. Ark. Agric. Exp. Sta. 1950 : No. 19 : Pp. 7.

Arkot 2-1, derived from a single plant selection of Stoneville 2B, is a high yielding cotton which matures earlier than most commercial varieties in Arkansas. The crop can therefore be harvested earlier and a better grade secured. Its ginning outturn is 34.5 to 36.5%; its staple length ranges from $1\frac{5}{32}$ to $1\frac{1}{32}$ in. The variety produces strong and relatively fine fibre and its spinning quality is satisfactory. The bolls are easy to pick either by hand or machine; the locks are firmly held by the bur so that the variety is resistant to storms.

1185.

A new Research Station for the Empire Cotton Growing Corporation.

World Crops 1951 : 3 : 33-35.

Cotton Research Station, Namulonge, Uganda.

Nature, Lond. 1951 : 167 : 24-25.

An account is presented of the official opening and research programmes of the Empire Cotton Growing Corporation's new research station at Namulonge, near Kampala, Uganda. The work planned includes the breeding and first multiplication of pedigree stocks of the commercial cotton variety BP52, the transfer of genes conferring resistance to bacterial blight to East African commercial stocks and the development of heavy cropping cottons for further selection at territorial stations.

1186. DEODIKAR, G. B.

Cytogenetic studies on crosses of *Gossypium anomalum* with cultivated cottons. I. [*(G. hirsutum* x *G. anomalum*) doubled x *G. hirsutum*].

Indian J. Agric. Sci. 1949 : 19 : 389-99.

Synthetic hybrids between cultivated cottons and *Gossypium anomalum* are characterized by rapidity of growth, vigour, good fibre properties and tolerance of some of the diseases and pests of commercial cotton. At the Agricultural Research Station, Surat, the synthetic hexaploid obtained by crossing *G. hirsutum* and *G. anomalum* and doubling the chromosome number of the sterile hybrid by colchicine treatment is being repeatedly back-crossed to *G. hirsutum* with a view to transferring the economically valuable characters of *G. anomalum* to cultivated tetraploid cotton. The present paper summarizes the results of cytological investigation of the first back cross generation.

Chromosome numbers in first back cross individuals were found to be $2n = 65$ to 69. These numbers were expected upon the basis of the allopolyploid genomic constitution (AADDDB) of the plants. During meiosis univalents and multivalent associations of 2, 3, 4 and 6 chromosomes were observed in variable proportions; the majority of the chromosomes associated as bivalents. Some indication was obtained that the chromosomes in excess of the normal pentaploid number of $2n = 65$ mostly participated in trivalent and hexavalent associations. Hexavalents were however also observed in the case of plants with $2n = 65$. The chromosomes of the B genome from *G. anomalum* probably act as bridging links between chromosomes of the A and D genomes so that all three sets may occasionally enter into multivalent associations. The fact that chromatin bridges are formed during the anaphasic separation of the multivalents supports this interpretation. The majority of the *G. anomalum* chromosomes appear as univalents

scattered at random in isolated groups, each of which develops into a micronucleus, by a process of internal free cell formation. The paper concludes with a discussion of the cytological results which may be expected in subsequent back cross generations, on the basis of the meiotic behaviour of the BC₁ individuals.

1187. MANOLOV, I.
(Causes of shedding of buds, flowers and young fruits of cotton).
 Spis. Naučno-Izsled. Inst. Min. Zemed. Gorite. (Rev. Sci. Res. Inst. Min. Agric. For.), Sofia 1950 : 18 : No. 3 : 3-15.

Varietal differences in shedding of buds, flowers and young fruits were recorded. This tendency may be regarded as an indication of the drought resistance.

1188. LQDEN, H. D.,
 LEWIS, C. F. and
 RICHMOND, T. R.
The effects of time and method of pollination on seed set in American Upland cotton.
 Agron. J. 1950 : 42 : 560-64.

A detailed report is given of investigations which have already been referred to in *Plant Breeding Abstracts*, Vol. XX, Abst. 2164.

1189. KUBERSINGH.
The extension of the improved varieties of cotton in member-states of Central India and Rajputana.
 Indian Cott. Gr. Rev. 1950 : 4 : 106-17.

An account is given of work connected with the distribution of improved cottons in Central India and Rajputana, with reference to the varied nature of the territories involved, condition of the cultivators, the organization and facilities available, the improved varieties and the problems encountered in their distribution. The varieties distributed comprise Malvi 9, Jarila, Buri 107 and Cambodia Indore 1.

1190. BALLS, W. L.
Natural selection in Egypt's cotton crop.
 Emp. Cott. Gr. Rev. 1950 : 27 : 243-59.

Gossypium hirsutum var. *punctatum* has a superiority in seed production compared with the best yielding Egyptian cotton, and has been capable of doubling its proportions in a contaminated seed stock in approximately two years. Reports of results of seed control by artificial selection are included for the Sakel, Ashmouni, Pilon, Farouki, Casuli, Nahda, Fuadi and Maarad varieties. Similarity in rates of increase of var. *punctatum* in all varieties is observed, and the age of any variety can be calculated from its content of this type.

Natural selection of low quality cotton has also occurred in certain areas where the varieties Sakel, Malaki, Karnak and Sakha Four have not been sufficiently safeguarded by seed renewal. Spinning test control is being adopted to prevent further deterioration within the seed renewal system.

1191. PETERS, R. W.
Mechanical harvesting of cotton in Queensland.
 Qd Agric. J. 1950 : 71 : 197-205.

The introduction of the mechanical cotton harvester has promoted changes in the criteria for breeding and selection. The ideal plant is now one under five feet in height, having an open growth habit, with a minimum of vegetative growth at the base of the plant and with a symmetrical arrangement of bolls. Progress has already been made in improving commercially grown varieties.

1192. SREENIVASAN, P. S.
A study of cotton grown under constant soil moistures. Part II.
Dry weight, yield and economy of water.
 Proc. Indian Acad. Sci. 1949 : 30 : 249-58.

Differential response to soil moisture was shown by an improved strain of Asiatic cotton and the variety MU₄ of American cotton.

1193. BALASUBRAHMANYAN, R. and
 RAGHAVAN, A.
Bacterial blight on cotton in Madras.
 Indian Cott. Gr. Rev. 1950 : 4 : 118-23.

The occurrence of blackarm in India is confined to parts of Madras. Cotton varieties have been studied at Coimbatore for their reaction to the disease in artificial inoculation tests based upon methods recommended by Knight and Clouston (cf. *Plant Breeding Abstracts* Vol. IX, Abst. 1312) and Simpson and Weindling (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 286); grading was based upon lesions of both stems and leaves. Varietal differences among the Madras American cottons were established, Co.4 (Co.2 x A 12) showing the highest degree of resistance. Only Co.4 responded to reselection for blackarm resistance, yielding a useful secondary selection Co.4/B40-21. The artificial inoculation tests have also proved valuable in grading hybrid derivatives. Some evidence has been obtained that south Indian varieties of *Gossypium arboreum* are virtually immune from blackarm disease. The natural resistance to blackarm disease shown by Cambodia cotton in the form of the pure line selection Co.2 is due, it is suggested, to the accumulation of minor genes for increased resistance under the wetter climatic conditions of Indochina. The maintenance of resistance of Co.2 in Madras is in contrast to the behaviour of African introductions, whose resistance in most cases broke down, probably because they contained only the weak gene *B*₁ for resistance and because in subsequent selection in Madras improvement in quality was concentrated upon and the possible lowering of blackarm resistance ignored.

1194. DHARMARAJULU, K.,
 SESHADRI AYYANGAR, G.,
 RAMASWAMI MUDALIAR, V. and
 BALASUBRAHMANYAN, R.
Studies on host resistance of cotton to stem weevil (*Pemphorus affinis*).
 Indian J. Agric. Sci. 1948 : 18 : 151-64.

In experiments at the Cotton Breeding Station, Coimbatore, Madras, it was found that resistance in cotton to *P. affinis* depended upon the ability to grow rapidly and retard the development of the pest at the larval stage by the release of a gummy exudate in affected regions. The South American varieties Verdao and Peruvian (*Gossypium barbadense*) and Moco (*G. purpurascens*) proved to be highly resistant under conditions of heavy artificial infestation. Bourbon (*G. purpurascens*) and Nadam (*G. arboreum* var. *typicum*) showed tolerance, withstanding damage by rapid repair of the affected tissues. Other cottons were susceptible in varying degrees. Although susceptible to stem weevil, the local variety Co.2 was superior to resistant varieties in yield, plant habit and boll characters. Reselection for resistance in Co.2 gave no positive results. In interspecific crosses the resistance of the South American parents was reduced as early as the first back cross generation. Moco and Bourbon proved to be the best parents for transferring resistance. Two derivatives from the first back cross of the hybrid between Moco and Co.2 were highly resistant to stem weevil but inferior to the local variety in other characters. Improvement in quality by further crossing of the derivatives with recently developed local strains appears to be a promising line of approach, although it is pointed out that combining quality and resistance is a difficult and slow process. No relation was found between any morphological characters and host resistance.

1195.

New flax variety for Minnesota, Dakota.

Crops and Soils 1950 : 3 : No. 1 : p. 27.

Redwood, a new flax variety for Minnesota and South Dakota, is scheduled for release by the Minnesota Agricultural Experiment Station in 1951. Developed from a cross between B-5128 and Bison, the variety is immune from all known races of rust in North America. It is high yielding and medium in maturity, with high oil content and a fibre content of the straw above the average.

1196.

SACKSTON, W. E.

Effect of pasmo disease on seed yield and thousand kernel weight of flax.

Canad. J. Res. 1950 : 28 : Sect. C : 493-512.

Two lines of investigation are reported: (1) the development of effective methods of inoculating flax plants with *Septoria linicola* in the greenhouse and of establishing artificial epiphytotics in the field; and (2) determination of the effect of the fungus on the seed yield and 1000 kernel weight of four flax varieties grown in inoculated plots during the three year period 1945-1947.

The four flax varieties tested exhibited differences in reaction to the disease, Viking being the most and Crystal the least susceptible. In all four varieties heavy infections caused premature ripening and reduced seed yield and 1000 kernel weight. Seed yield and 1000 kernel weight were reduced most severely by inoculation at the flowering stage and least by inoculation at the time of ripening. Highly significant positive correlations between seed yield and 1000 kernel weight indicated that much of the loss in yield resulted from reductions in the size of individual seeds.

1197.

MILLIKAN, C. R.

Studies of strains of *Fusarium lini*.

Proc. Roy. Soc. Vict. 1949 : 61 : 1-24.

The effects of various chemicals and of the pH of the substrate on strains of *F. Lini* collected in Victoria and in Minnesota, and the differential reactions of flax varieties to different strains are described. In any one flax variety considerable difference may occur between individual plants in the time taken to develop wilt symptoms and it is therefore necessary that tests should last long enough to enable all susceptible plants to develop symptoms.

1198.

Progress of research schemes.

Jute Bull. 1950 : 13 : 326-28.

Breeding experiments and varietal trials with *Corchorus capsularis* and *C. olitorius* are progressing. The effects of storage on radicle growth rates showed varietal differences.

1199.

Bulletin on the Marketing of Sunn Hemp in India.

Publ. Agric. Market. Adviser India 1948 : Market Ser. No. 61 : Pp. 80.

Work on the development of improved types of sunn hemp has so far been confined to selection from existing strains. Reference is made to Kanpur 12, an improved strain obtained in the United Provinces, and two early maturing varieties, M18 and M35, selected in the Central Provinces.

1200.

BELISARIO, M. C.

A comparative study of four varieties of ramie.

Philipp. Agric. 1949 : 32 : 185-214.

A comparative study of the varieties Saikeseisin, Guiran Taipan 1, Formosa and Kogai, carried out at the College of Agriculture, Laguna, Philippines, is reported. The characters

studied comprised shoot emergence, general appearance of the plants, susceptibility to pests and diseases, flowering and maturity periods, plant height, shooting habit, branching tendency, weights and percentages of the various constituents of the fresh stalks, and dry fibre yield.

1201.

Sisal Experimental Station Annual Report for the year 1948.

Dep. Agric. Sisal Board Tanganyika 1948 : Pp. 22.

About 300 selected hybrids were maintained. Bulbils of hybrids from Amani and Mlingano were planted in nurseries.

The results are given of a trial of ten *Agave amaniensis* x *A. angustifolia* hybrids compared with *A. amaniensis*; fibre yields per acre and the leaves cut and leaves produced per plant are tabulated.

Hybrid maize selections from the USA gave disappointing results.

SUGAR PLANTS

1202.

BARNES, A. C.

The present sugar cane variety situation in Jamaica with reference to variety introduction and to the cane yield survey 1949.

Jamaican Ass. Sug. Techn. J. 1949 : 13 : 25-29.

The relative importance of different sugar cane varieties during the past 15 years in Jamaica is analysed. It is stressed that the present varietal position must have a definite influence upon the incidence of mosaic, involving, as it does, a change from POJ 2878, a cane immune from mosaic, to B 34104, a susceptible but tolerant variety, and to B 3439 which has now exhibited some susceptibility. A greater number of seedlings are being imported from the Central Sugar Cane Breeding Station, Barbados, in the hope of securing improved canes resistant to mosaic. In the discussion following the paper, reference was made to the incidence of pokka boeng on the newer varieties.

1203.

ANTHONY, P.

Chambre d'Agriculture de L'Ile Maurice. Rapport du Président sur l'exercice 1949-50. (The Chamber of Agriculture of Mauritius. Report of the President on the year 1949-50).

Rev. Agric. Maurice 1950 : 29 : 168-203.

Section II of this report deals with the work of the Sugar Cane Experiment Station, Réduit. The new variety M423/41, bred by the station, continues to show exceptionally good qualities and is superior to M134/32. It is now on the list of approved canes for planters. M213/40 is to be further tested for its factory qualities before release.

Section IV of the report records the observations of R. H. Fraser (Rhodesia) on tobacco growing in Mauritius (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2513). Apparently the variety Amarello cannot be replaced, as it yields such high profits in spite of its peculiar aroma, which makes it unsuitable for export.

1204.

CALMA, V. C. and
SAMONTE, H. A.

Agonomic characteristics of (POJ 2878 x P.S.A. 14) F₁ sugar cane seedlings.

Philipp. Agric. 1947 : 31 : 34-43.

Information is given on the variability of several characters of F₁ seedlings from the cross POJ 2878 x PSA 14. In selection special emphasis was given to weight of millable stalks, seedlings which produced a mean weight of millable stalks exceeding the mean of all the seedlings being retained; on this basis 47.11% of the total number of 208 seedlings were selected.

1205. RAMOS, F. V. and
CALMA, V. C.
The production and selection of (P.B. 929 x POJ 2878) F₁ seedling canes.
Philipp. Agric. 1949 : 32 : 297-304.

Hybridization was undertaken with a view to combining the high sucrose content and large stalks of PB 929 and the high tonnage, high sucrose content and disease resistance of POJ 2878; the first named variety was derived from a cross between POJ 2878 and PB 363. The hybrid seedlings exhibited a high degree of variability in number of millable and non-millable stalks, weight of millable stalks and apparent purity of the juice of millable canes. From 36 seedlings 6 were selected, which are recommended for rapid propagation and comparative field trial with standard varieties.

1206. BUZACOTT, J. H.
Recent trends in the production of cane seedlings in Queensland by the Bureau of Sugar Experiment Stations.
S. Afr. Sug. J. 1950 : 34 : 721-27.

An account is given of the techniques employed in cross pollination.

The value of several noble cane crosses involving *Saccharum robustum*, introduced from New Guinea, has not been as great in the northern areas as originally expected, but two crosses of the noble canes Korpi and Q 13 with the Badila seedlings C 278 and C 279, respectively, have produced vigorous progeny which have been back-crossed with their noble parents in 1950. In the central and southern areas the varieties POJ 2878 and Co.290 of *S. spontaneum* have been used in various crosses to produce several commercially successful varieties, including Q 28 from Co.290 x Q 1098, Q 42 from Co.281 x Q 33, Q 45 from POJ 2878 x SC 12/4, Q 47 and Q 49 from Co.290 x POJ 2878 and Q 50 from POJ 2725 x Co.290.

The present breeding programme aims to produce varieties: (1) which are earlier maturing in all districts; (2) in which lodging is infrequent; (3) with resistance to red rot, leaf scald and chlorotic streak; and (4) which will be adapted as stand-over types for the southern climatic conditions. It is pointed out that the application of the principles of introgressive hybridization is limited in Queensland by the tendency of the recurrent female varieties not to produce arrows freely, so that only a small proportion of the progeny may flower, and the fact that suitable males represent only a small percentage of those seedlings which do flower.

1207. YAMADA, I. and
FUROSATO, W.
(Sugar cane investigations. II. Investigations on the flowering of the sugar cane in Saipsai Island).
Seiken Jiho (Biological Report) 1942 : No. 1 : 85-88.

Information is given on the earing and flowering dates of a series of sugar cane varieties.

1208. L., H. M.
The flowering of the sugar cane.
S. Afr. Sug. J. 1950 : 34 : 517-19.

Lack of correlation between flowering and economic maturity is stressed. The late maturing varieties POJ 2725 and CP 27-319 flower annually, but Co.281, Co.290 and POJ 213 rarely flower before harvesting. Increase in juice purity two or three months after flowering occurs in most varieties, but POJ 2725 matures and deteriorates in less than one month.

Attempts to ascertain the effect of altitude on flowering showed negligible differences between the varieties F 29-7, Co.285, Co.312 and Tuc.519.

1209. FORS, A. L.
Sugar cane varieties adapted to inadequate agronomic and climatic conditions, with especial preliminary reference to the cane known as "Pepe Cuca".
 S. Afr. Sug. J. 1950 : 34 : 645-51.

The soils found in the zone between Cienfuegos and Santa Clara in the province of Las Villas, Cuba, are not suited to the standard varieties of sugar cane cultivated in the rest of the island. The performance of the standards Co.281, Co.213, Co.290 and POJ 2727 in this zone is discussed. Among the varieties recently introduced into the region, in the search for suitable canes, are POJ 2961 (POJ 2722 x POJ 2801), PR 900 [(POJ 2364 x SC 12 (4))], POJ 3016 (POJ 2878 x POJ 2940) and Pepe Cuca whose exact origin is at present unknown. Preliminary data on the last named cane suggest that it is a particularly promising variety for the zone in question.

1210. KRISHNA, P. G.
Investigations on the alkalinity and saltishness in gur made from Coimbatore sugarcane varieties.
 Indian J. Agric. Sci. 1949 : 19 : 163-79.

Samples of gur made from Co. varieties were analysed for colour, hardness, taste and chemical constituents, with a view to discovering the causes of the salty taste in gur made in certain new regions of sugar cultivation in Hyderabad-Deccan. Salty taste or freedom from such a flavour may be a varietal characteristic indicating selective absorption of the salts present in the soil. Salty taste in gur is due to the presence of chlorides; if the chlorine content is more than 0.50% the gur tastes saltish. For new irrigated areas of sugar cultivation, a variety such as Co.419, which always yields sweet gur, should be grown, or at least two crops of rice should be cultivated previously to leach out the salts and minimize the chances of producing cane which produces salty gur. For reclaiming saline areas, Co.290, a very hardy cane, is recommended, as this variety not only absorbs large amounts of salts but withstands water-logging.

1211. SINGH, S. B. and
 KRISHAN, R.
The time of planting sugarcane in relation to varieties and manuring.
 Indian J. Agric. Sci. 1948 : 18 : 123-28.

A significant interaction between time of planting and variety was noted in experiments at the Sugarcane Research Station, Shahjahanpur. All varieties studied gave reduced yields with later planting dates, but the losses were greater in Co.385 and Co.313 than in Co. 312, Co.421 and Co.331. In any programme of planting spread over a long period the varietal sequence in planting should therefore figure as an important consideration. The differential response of the varieties to nitrogen varied with planting date. Co.313 and Co.421 exhibited a decreasing response to nitrogen with later planting; in Co.331, a late variety, the response appeared to increase slightly with later planting.

1212. STEIB, R. J. and
 CHILTON, S. J. P.
The *Phytophthora* rot of sugarcane seed pieces in Louisiana.
 Sug. Bull., N.O. 1950 : 29 : 69, 77-78.

Three distinct types of *Phytophthora*, one of which was identified as *Ph. erythroseptica*, have been isolated from sugar cane showing the disease symptoms similar to the advanced stages of red rot (*Phylospora tucumanensis*). Five varieties which were inoculated differed in their resistance to the cultures used.

1213. VARMA, S. C. and
MITAL, S. P.
The structure of xylem vessels in the nodal region of sugarcane in relation to its resistance to red-rot (*Colletotrichum falcatum*, Went).
Indian J. Agric. Sci. 1949 : 19 : 383-87.

Experimental evidence has been obtained that the xylem vessels act as channels for rapidly conveying *C. falcatum* spores, and that in sugar cane varieties with septa at the nodes infection is therefore prevented from spreading further. Immersion of cane tops in Indian ink suspension has shown that Indian ink particles are carried across the nodes through a larger number of vascular bundles in red rot susceptible varieties, such as Co.312 and Co.213, than in resistant varieties such as Co.393 and Co.453; the presence of septa was found to prevent the flow of the particles. A laboratory test with Indian ink suspension should offer a rapid measure of detecting the degree of red rot resistance in sugar cane varieties.

1214. KHANNA, K. L. and
SHARMA, S. L.
Lower epidermis of leaf midrib as an indicator of its hardness in sugarcane.
Proc. Indian Acad. Sci. 1949 : Sect. B : 30 : 307-15.

Since it has been suggested that hardness of leaf midribs in sugar cane is a major factor in imparting resistance to the top borer *Scirpophaga nivella*, an analysis of the anatomical structure of the midrib was undertaken, using 13 varieties of sugar cane. The thickness of the outer wall of the elongated cells of the lower epidermis was found to be a fairly reliable indication of the weights required to puncture the midrib on its convex side and thus of the hardness of the midrib. Four varieties however showed an erratic behaviour in this respect, which could be explained by the size and number of the vascular bundles and of the sclerenchymatous regions and also by the thickness of the sclerenchymatous cell walls, when these features were considered in relation to the size of the midrib in cross section. No consistent association was found between number of silicified cells and hardness of midrib as indicated by the puncture weights.

1215. STEVENSON, G. C.
Report on the sugar cane variety situation in Jamaica.
Bull. B.W.I. Cent. Sug. Cane Breed. Sta. 1950 : No. 32 : Pp. 8.

The sugar cane variety situation is surveyed as a result of a visit to Jamaica in April 1950. The principal varieties in cultivation, new varieties under trial on the estates and problems of breeding and testing mosaic resistant seedlings for Jamaica are discussed. Recommendations are put forward concerning the procedure of varietal trials on the estates, and the recording of the reaction of varieties and seedlings to mosaic for the purpose of aiding breeding work in Barbados.

1216. BOURNE, B. A.
The control of sugar cane mosaic disease.
Jamaican Ass. Sug. Techn. J. 1949 : 13 : 65-67.

Sugar cane breeding for resistance to mosaic at the Everglades Experiment Station, Fla, is described. Only the mosaic strain B has occurred so far at this station. Among present varieties of commercial significance, eight show immunity to strain B and five a high degree of resistance under natural conditions of infection. Immune or highly resistant varieties all possess a triple hybrid origin involving *Saccharum officinarum*, *S. Barberi* and *S. spontaneum*.

1217. KING, N. J.
Varietal deterioration in Queensland.
 Aust. Sug. J. 1950 : 42 : 455-59.

There is evidence that deterioration of hybrid sugar cane varieties in Queensland may be due to minor diseases without easily recognizable symptoms, as in the case of Q 28.

1218. KING, N. J.
Deterioration of sugar cane varieties in Queensland.
 S. Afr. Sug. J. 1950 : 34 : 741-45.

It has been established that the declining fertility and physical structure of the soil, attacks by the major cane diseases and changing climatic conditions are not responsible for the rapid deterioration of newly developed varieties in Queensland in recent years.

Yield tests carried out with new and old varieties of similar class and age, on the same soil types, have provided data from which an analysis of the extent and significance of the differences has been possible. Most of the new varieties have been introduced since 1945 and, on the whole, they have given approximately the same yields as in their original varietal trials but the variety Q 28 has shown a marked yield decrease in two years of commercial production. There are no distinctive disease symptoms in this variety except severe stunting of the ratoons, which has been transmitted to healthy plants in inoculation; this effect has been recognized as a disease of, as yet, unknown cause and origin. It has been suggested that similar diseases have in the past contributed to the loss of vigour in other varieties, whose tolerance has tended to mask the stunting, so that the effect has been observed as a gradual varietal deterioration.

1219. COSTE, R.
 Esquisse agricole de L'Ile Maurice. (**An agricultural sketch of Mauritius**).
 Agron. Trop. 1950 : 5 : 366-83.

In this account of Mauritius and its resources mention is made of the following sugar cane varieties: M-134-32 (POJ 2878 x D 109) a fast growing cane, resistant to cyclones and drought, and two new varieties bred at the research station, M-213-40 and M-423-41 (M 134-32 x M 99-34) which are regarded as very promising.

The tobacco, grown for home consumption only, is represented by a single variety Amarello, probably a hybrid of Virginia, originally imported from South Africa and Brazil.

1220. CALMA, V. C. and
 RAMOS, F. V.
An outstanding introduced variety of sugar cane.
 Philipp. Agric. 1950 : 33 : 190-96.

The introduced variety College 39 has been compared with three standard varieties grown in the Philippines. Although it produced the same number of millable stalks in a stool, these had a mean weight of 17.99 kg. compared with the average weight of millable stalks per stool of the three standard varieties, which varied from 9.12 to 10.01 kg. College 39 also produced superior yields of cane and sugar per ha. and gave the highest purity of juice.

1221. JOHNSON, R. T.
The role of plant breeding in sugar beet production.
 Spreckels Sug. Beet Bull. 1950 : 14 : 45, 46, 48.

Sugar beet tests being carried out by the Spreckels Sugar Company, Calif., include varieties developed by the company. One of these, S-2, possesses a high degree of resistance to both curly top and bolting. Although S-2 has exceeded other varieties in tonnage of beets and sugar per acre, its sucrose percentage has been somewhat lower. Selection is in progress in an attempt to increase the sucrose percentage of S-2 while maintaining its high yield and

resistance to bolting. The production of varieties with single germ seed and of F_1 hybrid sugar beet is also receiving attention.

1222. MCVICKAR, G. E.
New sugar beet hybrid, developed at Michigan, outyields present types.
Crops and Soils 1950 : 3 : No. 1 : p. 26.

Mention is made of sugar beet hybrid 125, developed by the Michigan Agricultural Experiment Station. In tests in Michigan, Ohio and Canada its production has averaged 14% more per acre than the best commercial variety; the hybrid produces larger and more uniform roots than any of the commercial varieties now grown. It is expected that seed will be available in 1951.

1223. WOOD, R. R.
New field refrigerator tests hardness of sugar beet strains.
Crops and Soils 1950 : 3 : No. 3 : p. 24.

Varietal tests of sugar beet seedlings for cold resistance, carried out in the field at the experimental station of the Great Western Sugar Company, Longmont, Colorado, using a new portable refrigeration unit, revealed that the progenies of resistant beet had superior sugar content.

1224. GRAF, A.
Vier Zuckerrübensortenversuche in zwei verschiedenen Klimagebieten.
(Four trials with sugar beet in two different climatic regions).
Bodenkultur, Wien 1950 : 1. Sonderheft : 115-25.

The trials were made in two dry localities, Fuchsenbigl and Gerhaus, and two wet localities, Grabenegg and Lambach. The yields of beets and sugar and the combined yield of leaf and tops were found and resistance to *Cercospora* was observed.

In all four localities the varieties Beta 242-53, Ukr. Lebedinski, Dobrovice N and Sandomiersko N showed yields 7-14% above the average and are therefore recommended for cultivation; Buszczyński CLR and Beta Y19 gave average yields, but were notable for their resistance to *Cercospora*, even without spraying.

1225. MIÈGE, J.
Caractères du *Dioscorea minutiflora* Engl. **(Features of *D. minutiflora* Engl.).**
Rev. Bot. Appl. 1950 : 30 : 428-32.

The resemblances between *D. minutiflora* and *D. smilacifolia* and related species indicate that they are closely related or else hybrids between various closely related types belonging to one group. The stem morphology and the special features of tuberization in *Dioscorea* are the subject of the present note with reference to morphological differentiation in the two species.

STIMULANTS

1226.
New large-leaved tobacco gives increased output.
Soviet News 1950 : No. 2451 : p. 4.

A new tobacco variety with particularly large leaves is to be planted in the Kuban, Transcaucasus, Central Asia and Moldavia in 1951. It is expected that this tobacco will increase the yield by 15 to 20%. It is stated that although the variety grows rapidly the quality and aroma of the leaves are not diminished, as is usually the case, but are on the contrary increased as a result of the rapid growth. In processing, 30 to 40% of the leaf is first grade tobacco. The variety is also labour saving, since only 18,000 plants are required per acre, whereas with former varieties about 40,000 were planted.

1227. ASTORGA B., E. and
QUINTANA, F. R.
Compañía Chilena de Tabacos. Tobacco Grading Plant and Experimental Station, Chagres, Province of Aconcagua, Chile.
Report on year's work season 1947-48 : Pp. 25.

The results are given of extensive studies of tobacco varieties with respect to yields and earliness. Progress in breeding for mosaic resistance, petiolate leaves and earliness is briefly described; back-crossing is being employed in all three projects. Experiments for studying factors relating to such characters as distance between the leaves and the one sucker character were also continued, a total of 11 F_2 hybrids and 19 strains, each selfed and back-crossed, being planted out. Eight single cross hybrids and 11 double cross hybrids were observed for yield and earliness in connexion with an investigation of heterosis, and 44 hybrids from intercrosses of ten varieties were studied for the purpose of ascertaining whether any possessed a "stimulating factor" having an influence on the different crosses.

1228. SMITH, H. H.
Differential photoperiod response from an interspecific gene transfer.
J. Hered. 1950 : 41 : 199-203.

Mammoth tobacco differs from most strains of *Nicotiana Tabacum* by a gene which, in the homozygous recessive condition (*mm*), causes the normally day-neutral plant to flower only under short photoperiods. Since mammoth tobacco plants develop many leaves under field conditions in summer, due to continued vegetative growth under long day conditions, an attempt was made to incorporate the gene pair *mm* in *N. rustica* with the aim of developing larger types of the latter species. Segregants carrying the factor pair *mm* in an essentially complete genotype of *N. rustica* were secured in the sixth selfed generation after the fourth back cross; they showed however a photoperiodic response different from that of the original *N. Tabacum* parent, failing to flower under photoperiods of 6, 8 and 18 hours in a 24 hour cycle, under continuous light, and in the normally short days of winter. Mammoths of *N. Tabacum* flowered under any of the above short photoperiods. Two anomalous cases of flowering among the *N. rustica* mammoth plants occurred, suggesting that such plants are capable of flowering but require some as yet unknown environmental conditions involving photoperiod, temperature and moisture. The significance of these results to the general theory of the back cross technique is stressed. The expression of the mammoth character is clearly dependent upon the combined influence of an environmental factor in the form of photoperiod, a single gene locus and the residual genotype.

1229. CLAYTON, E. E.
Male sterile tobacco.
J. Hered. 1950 : 41 : 171-75.

When *Nicotiana Debneyi* was crossed as female parent with *N. Tabacum* and the latter species was used as the pollen parent in successive back crosses, male sterility gradually developed. Some sterility occurred in the first back cross; the third back cross plants were all completely male sterile; plants at this stage of back-crossing had a chromosome complement of 24 bivalents of *N. Tabacum* and 4 to 7 univalents of *N. Debneyi*. In reciprocal crosses in the early back cross generations, when the hybrid plants were used as the male parents, male sterility did not occur. The male sterility has remained complete up to the tenth back cross. To eliminate male sterility it was necessary to use *N. Tabacum* as the female not later than the second back cross, or *N. Debneyi* as the male parent at the same stage of back-crossing. The sterility appeared to be due to incompatibility between the cytoplasm of *N. Debneyi* and the chromosomes of *N. Tabacum*. Similar results were obtained by back-crossing the hybrid between *N. megalosiphon* and *N. Tabacum*, the latter forming the male parent in the original cross and subsequent back crosses. The significance of this male sterility as a possible danger in breeding by interspecific hybridization is pointed

out. Male sterile tobacco may have practical value in the production of hybrid seed, and as a means of eliminating the need of topping plants in the field.

1230. HAGIYA, K.
(**Physiological studies on the storage of tobacco pollen**).
Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 61-64.

The behaviour of the pollen of the variety Orinoco under various conditions of storage was investigated. The size of the seed obtained after fertilization with stored pollen was usually much smaller than with normal pollen. Stored pollen also gave rise sometimes to various malformations in the offspring, and these, when very old pollen was used, tended to become more pronounced as the offspring grew.

1231. COSTA, A. S. and
FORSTER, R.
Um enrolamento das folhas do fumo de causa genética. (**A genetically caused leaf roll in tobacco**).
Bragantia, São Paulo 1949 : 9 : 43-45.

A description is given of a genetically determined leaf roll affecting tobacco. Leaf roll is recessive to normal, but in the F_2 of crosses between normal and affected plants, intermediate expression of the leaf roll symptoms was noted, suggesting that more than one factor pair is involved.

1232.
**Annual Report of the Director, Tocklai Experimental Station,
Indian Tea Association. Scientific Department. 1949 : Pp. 38.**

The importance of heterosis in tea improvement has become clear. Inbreeding frequently results in loss of vigour. It is pointed out that the requirement of clones for vegetative propagation and for clones for seed production is fundamentally different: the former clones should be heterozygous, the latter homozygous. It is expected that the field recognition of material likely to show heterosis will play an important part in future breeding methods.

Large seed results in larger plants in the nursery up to a certain point, beyond which no advantage is gained by use of larger seed. In sufficiently homozygous stock very large seed confers no advantage; with perennial and more heterozygous trees, seed of modal size appears to be the most desirable to select from the annual crop.

Arrangements have been made for establishing standard seed sources of three geographical types of tea. Stocks of representative intergrades are being multiplied for technical study.

1233. LEUPEN, F. F.
Conuga-koffie. (**Conuga coffee**).
Bergcultures 1950 : 19 : 377-83.

The name Conuga was coined by Ferucida out of *congensis* and *Ugandae* to describe hybrids of *Coffea congenensis* and *C. robusta* var. *Ugandae*, although Cramer, who first described these hybrids, called them Congusta to show that they are hybrids of *C. congenensis* and *C. robusta*.

The varieties known under Bangelan numbers are derived from spontaneous crosses of *C. congenensis* and *C. robusta* var. *Ugandae* or other forms of *C. robusta*. In this experimental garden are also two kinds from Madagascar, *C. congenensis* vars *Madagascar* and *Chalotii*, both thought to be hybrids, the latter from *C. congenensis* and *C. canephora*.

Conuga clones are generally quick growing, well formed, cylindrical trees whose primary branches persist for ten years or more and produce numerous side branches. They can be planted close, c. 640 per acre, and flower twice as often as *C. robusta*. The flowers are often highly self fertile. They are therefore suitable for areas wetter than normal, but they also resist drought and grow well up to an altitude of 600-700 m. Even at 1000 m. they are

better than unselected *C. robusta*, provided there is no marked dry period, in which case *C. arabica* is preferable. They are suitable as a catch crop for planting with *Hevea*. Generally they have low susceptibility to pests and diseases, but suffer more from berry borers and pink disease, while the continuous harvest throughout the year is a disadvantage. Seedlings segregate, so that only clones are planted. Six of these are in the top class: Con Bgn 2-03, 161, 6, 2-14 and 4 and Con SA 36. A mixture of 2-03, 4 and 2-14 will ensure a good fruit set.

At Malang, 139 clones have been selected out of selfed Conuga or Conuga x *C. robusta* families. Con SA 36 x BP 42 is a promising cross. At Besuki, 40 clones were selected and the yields of the best 10 are reported. The first six places are occupied by BP selections from Conuga, the last four by Conuga clones.

1234. KRUG, C. A.

Mutações em *Coffea arabica* L. (**Mutations in *C. arabica* L.**).
Bragantia, São Paulo 1949 : 9 : 1-10.

A general review is given of mutations in *C. arabica*, their genetic basis, interaction between mutant factors, and the economic value of the mutants Bourbon, Maragogipe, *xanthocarpa*, *cêra*, *laurina*, *semperflorens*, caturra and mokka.

1235. ELGUETA, M.

Un programa de selección para *Coffea arabica*. (**A selection programme for *C. arabica***).
Turrialba 1950 : 1 : 37-43.

A method of line selection of *C. arabica* is outlined in which the phase of individual tree performance is omitted.

1236. MENDES, A. J. T.

Observações citológicas em *Coffea*. XII. Uma nova forma tetraplóide.
(**Cytological observations in coffee. XII. A new tetraploid form**).
Bragantia, São Paulo 1949 : 9 : 25-34.

A new vigorous and productive 44-chromosome coffee is described which originated in a plantation in the state of São Paulo. It is inferred from its meiotic behaviour that the new form is a hybrid between *Coffea arabica* and tetraploid *C. Dewevrei*. It is marked by a considerable degree of pollen and ovule sterility. Hybrids were raised from crossing the new type with *C. arabica*, and diploid and tetraploid *C. Dewevrei*.

1237. MEDINA, D. M.

Observações citológicas em *Coffea*. XIII. Observações preliminares em *Coffea arabica* L. var. *rugosa* K.M.C. (**Cytological observations in *Coffea*. XIII. Preliminary observations on *C. arabica* L. var. *rugosa* K.M.C.**).
Bragantia, São Paulo 1949 : 9 : 47-51.

The rough leaves of *C. arabica* var. *rugosa* are not transmitted to its offspring. A cytological examination of var. *rugosa* showed that it was tetraploid ($2n = 44$) and that its rough leaves could not be attributed to chimerical make-up.

1238. KNAPP, W. P. VAN DER

Polyploidie ten dienste van de koffie-selectie. (**The case of polyploidy in breeding coffee**).
Arch. Koffiecult. Indonesië 1950 : 17 : 101-19.

The basic chromosome number of *Coffea* spp. is 11, which is the haploid number of *C. robusta* and *C. liberica*. *C. arabica* is tetraploid, while its variety *bullata* (Djamboe coffee) is octoploid. Colchicine may be of use in obtaining fertile hexaploids from *C. arabica* and *C.*

robusta crosses, or for doubling the chromosome number of *C. robusta* prior to crossing with *C. arabica*.

Doubling of chromosomes may reduce the occurrence of "round bean" in Conuga types, but it is unlikely to be effective with *C. robusta* where insufficient pollination is the cause; defective beans in *C. liberica* x *C. robusta* crosses are also due to insufficient pollination. Methods of treating coffee with colchicine are discussed and Mendes's graft method is recommended.

1239. CARVALHO, A. and
KRUG, C. A.
Agentes de polinização da flor do cafeeiro (*Coffea arabica* L.). [Pollinating agents of the coffee flower (*C. arabica* L.)].
Bragantia, São Paulo 1949 : 9 : 11-24.

Under natural conditions, the proportion of flowers setting seed was found to be 62%. In general self pollen is responsible for a higher seed set than air or insect borne pollen.

1240. MENDES, C. H. T.
Introdução ao estudo da autoesterilidade no gênero *Coffea*. (Introduction to the study of self sterility in the genus *Coffea*).
Bragantia, São Paulo 1949 : 9 : 35-41.

C. canephora is highly self sterile, self pollen hardly germinating on the stigmas, or if germinating, not penetrating beyond the stigmatic papillae.

1241. BERTRAND, G.
Recherche et dosage de la caféine dans plusieurs espèces de café.
(Research on and estimation of caffeine in several species of coffee).
Rev. Agric., Nouméa 1942 : 4860-63.

Though the species *Coffea Humblotiana* contains no caffeine, one of its constituents is cafamarin which produces a bitter taste and renders the coffee made from it unpalatable. It might be possible to eliminate this defect by suitable cultural measures or new species might be found containing no caffeine. With the latter object in view, nine species, comprising eleven varieties of *C. arabica*, were analysed for caffeine content and marked variation was found. *C. mauritiana* contained only 0.07% but *C. canephora* contained 1.97%. Whether the last mentioned species could be used to produce a palatable beverage remains to be ascertained.

1242. CARVALHO, A. and
KRUG, C. A.
Genética de *Coffea*. XII. Hereditariedade da cor amarela da semente.
(The genetics of coffee. XII. Heredity of yellow coloured seed).
Bragantia, São Paulo 1949 : 9 : 193-202.

The variety Cera [Yellow] of *C. arabica* has yellow endosperm, determined by the recessive gene *ce*. Endosperm of the constitution *Cecece* or *CeCece* is green. Cera is tetraploid and when crossed with diploid *Coffea* species gives rise to hybrids with yellow seeds only. Studies on the genetics of Cera have established that the bulk of the tissues surrounding the embryo in the coffee seed are endosperm and not perisperm.

1243. KRUG, C. A.,
MENDES, J. E. T. and
CARVALHO, A.
Taxonomia de *Coffea arabica* L. II. *Coffea arabica* L. var. *caturra* e sua forma *xanthocarpa*. (The taxonomy of *C. arabica* L. II. *C. arabica* L. var. *caturra* and its form *xanthocarpa*).
Bragantia, São Paulo 1949 : 9 : 157-63.

A full taxonomic description is given of the coffee variety Caturra from Manhumirim, Minas Gerais, for which a Latin diagnosis is provided with another for its yellow fruited

form. Caturra has $2n = 44$ chromosomes. It differs from Bourbon in its shortened internodes, abundant secondary branches and larger leaves. A single dominant gene *Ct* is believed to be responsible for the characteristics of Caturra. The gene for the yellow fruited form of Caturra is probably the same, *xc*, as that responsible for yellow fruits in var. *typica*.

1244.

Notes de la Chambre d'Agriculture. (**Notes from the Chamber of Agriculture**).

Rev. Agric., Nouméa 1942 : p. 4864.

This is a supplementary note to G. Bertrand's paper (cf. Abst. 1241) on the wild Madagascar species *Coffea Humblotiana*, which was introduced into New Caledonia some years ago for use in hybridization and grafting. In addition to being hardy it is not attacked by the diseases prevalent in the latter island.

1245.

MENDES, J. E. T.

Ensaio de variedades de cafeeiros. II. (**Trial of coffee varieties. II**).

Bragantia, São Paulo 1949 : 9 : 81-101.

Six Brazilian varieties are compared in respect of ripening date, bean size and yield.

1246.

STEVENS, W. L.

Análise estatística do ensaio de variedades de café. (**Statistical analysis of the trial of coffee varieties**).

Bragantia, São Paulo 1949 : 9 : 103-23.

Analysing the data summarized in Abst. 1245, the author shows how the disadvantages of a systematic design can be partially overcome by analysis of covariance on row number, while the marked fluctuation in yield from year to year can be dealt with by using suitable orthogonal functions of yearly yields.

1247.

Discussion and summing-up. Report of the Cocoa Conference held at Grosvenor House, London 13-14 September, 1950 : 44-58.

The general discussion, under the chairmanship of Lloyd Owen, included the following topics: assessment of new strains by fermenting and drying small samples; swollen shoot; the use of arboricides in pest control; black pod disease; capsid attacks; the injection of virus strains; and discussions on the swollen shoot campaign in the Gold Coast and Nigeria and research in Trinidad.

1248.

WEST, J.

West Africa Cacao Research Institute, 1944-49. Report of the Cocoa Conference held at Grosvenor House, London 13-14 September, 1950 : 2-5.

An account of swollen shoot in Nigeria and the Gold Coast is followed by brief references to capsid bug damage and black pod disease. Selection for high yields of large beans has produced N 38 and E 1 in Nigeria and the Gold Coast, respectively.

1249.

Cacao. A bibliography on the plant and its culture and primary processing of the bean.

U.S. Dep. Agric. 1950 : Library List No. 53 : Pp. 49.

Sections are included which list references on the taxonomy and varieties of cacao, selection and breeding, morphology, physiology, pests, diseases and research programmes.

1250.

Inter-American Technical Cacao Committee. Second Conference 1949.

Inter-Amer. Inst. Agric. Sci., Turrialba 1949 : Pp. 57.

The following information of interest to plant breeders is given concerning work on cacao in the countries participating in the conference:—

Colombia

Selection programmes are in progress in the various cacao growing regions.

Ecuador

The principal objectives of the cacao improvement programme include the selection, propagation, testing and distribution of disease resistant, high yielding clones and the introduction of as many species and varieties as possible for study and observation. Selections from among superior trees located during a survey made in 1944 and 1945 are being propagated for tests of disease resistance and yield. Selections from Colombia, Venezuela, Brazil, Costa Rica and Trinidad, representing five species of *Theobroma* have been introduced into Ecuador. Bean samples of each selection are being sent to chocolate manufacturers for analysis. Selections highly tolerant towards witches' broom have been obtained. An account is included of the discussion arising from a paper by R. L. Fowler on the selection of new clones in Ecuador.

Mexico

Research carried out at the recently inaugurated experiment station includes clonal selection on the basis of yield, quality, resistance to pests and diseases and general adaptability, and the establishment of a complete collection of all the cacao cultivated commercially. Good clonal selections have already been obtained.

Panama

Testing and selection of clones are being conducted by the United Fruit Company.

Venezuela

Selection has been continued and there now remain in the selection programme 110 trees of which records have been completed on 87; 35 trees are yielding between 5 and 13 lb. of high quality commercial cacao per year. They are now undergoing incompatibility tests. Species introduced from other countries are mentioned.

Trinidad

The work on cacao which is being conducted by the Imperial College of Tropical Agriculture is briefly surveyed; it includes the testing of selected clones and the breeding of varieties resistant to diseases, especially witches' broom.

A collection of witches' broom resistant clones from the College is to be distributed by the Inter-American Institute of Agricultural Sciences to countries participating in the conference.

Gold Coast

Clones from Trinidad have been established at Tafo and the trees are just coming into bearing. They all appear to be quite adaptable. Experience elsewhere also indicated that cacao is a very adaptable plant.

Costa Rica

Reference is made to the testing of clones by the United Fruit Company at Zent where experiments were inspected by delegates to the conference.

Proposals for future work at the Cacao Centre include investigations of biological specialization in *Phytophthora palmivora*, the nature of resistance and the development of a laboratory method for evaluating resistance. It has been noticed that when pods are inoculated and kept in a moist chamber, discoloration progresses more slowly on pods from resistant clones than on pods from susceptible clones.

1251. PONCIN, L.

Le cacaoyer à Tafo (Gold Coast). Une visite au "West African Cocoa Research Institute" W.A.C.R.I. [**The cacao tree at Tafo (Gold Coast). A visit to the "West African Cocoa Research Institute" WACRI**].

Bull. Agric. Congo Belge 1950 : 41 : 677-704.

The conclusions reached by the writer as a result of his visit to the Cacao Research Institute at Tafo agree largely with the 1944-49 report issued by the Institute (cf. *Plant Breeding Abstracts*, Vol. XX, Absts. 1815 and 1818).

1252. SOETARDI, R. G.

De betekenis van insecten bij de bestuiving van *Theobroma cacao* L. (**The importance of insects in the pollination of *Th. cacao* L.**).

Arch. Koffiecult. Indonesië 1950 : 17 : 1-31.

Experiments indicate that the flowers are not wind-pollinated but that females of the midge *Forcipomyia* sp. are the pollinating agents in Java. The insect is reported to occur in Trinidad and the Gold Coast and probably all countries where cacao is grown.

1253. MACLEAN, J. A. R.

Single-pod fermentation of cacao.

Nature, Lond. 1950 : 166 : p. 910.

A method for the fermentation of contents of single cacao pods is described, which has given promising preliminary results at the West African Cacao Research Institute, Tafo, Gold Coast, in the assessment of the quality of the crop produced by experimental trees.

1254. JOLLY, A. L.

The use of clip-cards in agricultural research.

Trop. Agriculture, Trin. 1950 : 27 : 108-22.

Applications of a manual card sorting system in which use is made of clipcards are described; the method is in use at the Imperial College of Tropical Agriculture, Trinidad. The chief advantage of the manual over the mechanical system is chiefly one of cost; the manual method is thus particularly suitable for small experimental stations. The uses of this system include the recording of individual tree yields of cacao.

1255. EDWARDS, N.

Cocoa-growing developments in Nigeria, disease control, rehabilitation and new plantings. Report of the Cocoa Conference held at Grosvenor House, London 13-14 September 1950 : 18-19.

A general summary is given of the cacao industry in Nigeria with remarks on the improvements needed in the quality and quantity of cacao produced and in transport facilities.

1256. EVANS, H.

Report on cocoa investigations in progress in Trinidad with a summary of results achieved to date. Report of the Cocoa Conference held at Grosvenor House, London 13-14 September 1950 : 20-31.

The work of the plant breeding section has included the following: (1) crossing and selfing within a group of promising ICS clones; (2) crossing outstanding ICS clones with the strains SCA 6 and SCA 12, which are immune to witches' broom; (3) studies on the inheritance of self sterility; and (4) crossing within a group of four Nicaraguan Criollo clones. Selection at the San Juan estate in Trinidad of open-pollinated progenies has produced several promising clones.

Work on disease control has been concerned mainly with witches' broom and cacao virus. Statistical examination of susceptibility after inoculation with witches' broom has shown

that ICS clones 1, 45, 55, 91, 95 and 98 are least susceptible, while SCA 6 and 12 are apparently immune. Investigations into the inheritance of resistance of F_1 seedlings from the cross SCA 6 (resistant) x SCA 1 (susceptible) are being made.

1257. BURCHARDT, A. and
JÖRGENSEN, H.
**A preliminary note on cacao work at Hacienda Clementina,
Ecuador.**
Cacao, Turrialba 1950 : 2 : No. 7 : 1-5.

Selection for resistance to witches' broom is being carried out at the Tropical Station of Pichilingue, Ecuador, using local cacao clones and introductions such as the ICS series from Trinidad and the Criollo series from Central America, which possess other desirable characters.

1258. *ONO, T.
(Hop breeding, in particular, experiments on polyploidy).
Seibutsugaku Gyoseki [Biological Results] 1948 : 2 : 1-9.

After a general introduction on hop breeding in Japan, the author records his own observations on stomatal and pollen grain size in untreated vines and colchicine induced polyploids. The material included American, European, and local varieties.

1259. KELLER, K. R.,
BULLIS, D. E. and
MAGEE, R. A.
The use of soft resin content for evaluating hops, *Humulus lupulus* L.
Agron. J. 1950 : 42 : 492-94.

Highly significant varietal differences in total soft resin content, α -acid, β -fraction and ratio of α -acid to total soft resin content are reported. An analysis of the variety Fuggles, grown seedless, revealed no differences in these values at different levels of yield. It is suggested that use of chemical determinations of α -acid would be valuable in both the purchasing and breeding of hops, in view of the varietal differences discovered in the ratio of α -acid to total soft resin content.

1260. HOED, F. and
ELSOCHT, P.
Essai d'introduction de la culture du houblon au Congo Belge. **(An attempt to introduce hop cultivation into the Belgian Congo).**
Bull. Agric. Congo Belge 1950 : 41 : 705-14.

In 1934 and 1947 hops from various countries were introduced into the Belgian Congo in an attempt to adapt European varieties to the climate there. Though the results here described have not been very successful, further experiments with material grown from seed instead of cuttings are to be undertaken.

1261. SALMON, E. S.
Thirty-third report on the trial of new varieties of hops 1949.
E. Mall. Res. Sta. 1950 : Pp. 13.

The results of trials at East Malling on a large number of new varieties originally raised at Wye College, Kent, are reported under the headings: origin of the new varieties; actual and estimated yields; number of bushels required per cwt; resin contents; the crop of new varieties marketed by registered growers; new varieties resistant to *Verticillium* wilt; brewing trials with the variety OT 48; and the challenge cups for new Wye varieties.

* An extended summary of this paper is on file at the Bureau.

MINOR CROP PLANTS

1262. SOKOLOV, V. S.

(Is there a correlation between the alkaloid content and essential oil content of plants?).

Priroda (Nature) 1949 : No. 7 : 60-62.

Russian investigations suggest that the alkaloid and essential oil content in plants are inversely related. Only a few species in three families of the principal 15 families of essential oil plants, namely the Myrtaceae, Umbelliferae and Labiatae in fact produce alkaloids. These species are *Eugenia Jambos* producing jambosin, *Conium maculatum* bearing conicin, *Lagochilus inebrians* yielding lagochilin and *Leonurus sibiricus* containing leonurin.

1263. SLOOFF, W. C.

Het huidige standpunt inzake het openspringen van de onrijpe nootmuskatvrucht. **(The prevailing view regarding the bursting of the unripe fruit of the nutmeg).**

Landbouw 1950 : 22 : 411-15.

Various factors, including heredity and pollination, are examined as possible causes of premature opening of the fruit of the nutmeg. The defect would appear to be due to physiological causes. It might possibly be controlled to some extent by planting good interfertile clones.

1264. PERRIER DE LA BATHIE, H.

Une nouvelle vanille de Madagascar. **(A new vanilla from Madagascar).**

Rev. Bot. Appl. 1950 : 30 : 435-36.

The new species, *Vanilla Coursii* sp. nov. is described, with observations on its fertility as compared with other species endemic to Madagascar.

1265. KRISHNA MENON, K.

The survey of pollu and root diseases of pepper.

Indian J. Agric. Sci. 1949 : 19 : 89-136.

A comprehensive survey was undertaken to discover the reasons for the decline of the pepper industry in South India. The survey includes descriptions of the pepper varieties (*Piper nigrum*) grown in the different districts, methods of vegetative propagation, and the diseases and pests of the crop; a list of varieties comprising the collection now established at the Agricultural Research Station, Taliparamba, is also provided. No existing variety has so far been subjected to improvement. Among the measures possible to increase the prosperity of the industry are (1) the selection of high yielding varieties from already existing material, aided by rapid vegetative multiplication, and (2) hybridization to develop varieties improved as regards yield, regular bearing, and resistance to drought, pests and diseases.

1266. BALDINI, E.

La biologia del peperone. **(The biology of the pepper plant).**

Ital. Agric. 1950 : 87 : 628-37.

As part of a programme of research on the biology and genetics of horticultural plants at the Institute of Arboriculture and Horticulture of the University of Florence, the writer has investigated the biology of the red pepper plant, including the compatibility between various *Capsicum* species.

The systematic classification of the pepper plant and the development and morphology of the floral organs are described and anthesis is discussed, with observations on the effect of environmental factors, e.g. temperature, water and nitrogen content of the soil, upon the set of fruits.

Experiments showed that self fertilization is normal in pepper, but successful cross pollination by insects may often occur between botanical varieties. Hence, to obtain

plants true to type single varieties should be grown separately or seed plants protected from cross pollination. Owing to the mechanism of anthesis fertilization occurs readily in the cages and artificial pollination is unnecessary.

1267. PENFOLD, A. R.,
MORRISON, F. R.,
McKERN, H. H. G. and
WILLIS, J.

Researches on essential oils of the Australian flora.

Mus. Technol. Appl. Sci., Sydney 1950 : 2 : Pp. 15.

Studies in the physiological forms of the Myrtaceae.
Part III. Preliminary observations on the nature and occurrence of Leptospermum citratum Challinor, Cheel and Penfold, variety "B."
(pp. 5-7).

In an analysis of open-pollinated progeny of *L. citratum* trees with different types of oil, growing in northern New South Wales, the following results were obtained. The progeny of type seed produced type (aldehydic) oil; progeny of variety "A" yielded the terpenic form of oil characterizing the parental variety. Progeny from variety "B," however, gave oils of diverse chemical composition, many of which had not been found in naturally occurring populations of *L. citratum*; only 3-5% yielded oils conforming to the description of the oil of the original variety "B." Further chemical analysis of the progenies revealed that the oils fall into four main groups, representing variety A, variety B, a form with high ester value and low aldehyde content, and a form with an aldehyde content intermediate between the type and variety B oils. The same four groups emerged in the analysis of samples obtained in a comprehensive survey of *L. citratum* in northern New South Wales. At present it is not intended to separate the latter two groups as physiological forms but to call them members of the "variety 'B' complex" pending information on breeding mechanisms in *L. citratum*. Data are given on the distribution of the species and its varieties in northern New South Wales. Among the features discovered are the following: type trees are never found in association with either variety A or B; the variety B complex is always associated with a large proportion of variety A trees but the converse does not hold, quite extensive areas of only variety "A" being found.

Studies in the physiological forms of the Myrtaceae.
Part IV. The occurrence of physiological forms in Melaleuca bracteata F. Muell. (pp. 8-11).

Analysis of trees of *M. bracteata* collected in northern New South Wales has revealed the existence of two valuable physiological forms, one with oils consisting largely of methyl-isoeugenol and another with oil consisting principally of elemicin.

Studies in the physiological forms of the Myrtaceae.
Part V. Eucalyptus citriodora Hook, and the incidence of its physiological forms. (pp. 12-14).

The occurrence of physiological forms appears to be the cause of low citronellal content in commercial consignments of *E. citriodora* oil.

- 1268.

Siebenjährige blütenbiologische Studien an den Cruziferen *Brassica napus* L., *Brassica rapa* L., *Brassica oleracea* L., *Raphanus* L., und *Sinapis* L. Teil I. (Studies during seven years on the biology of flowering in the crucifers, *B. Napus* L., *B. Rapa* L., *B. oleracea* L., *Raphanus* L. and *Sinapis* L. Part I).

Z. Pflanzenz. 1950 : 29 : 222-40.

In continuation of a similar study of floral biology of onions, parsnips, celery and parsley (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 762), the author has investigated flowering in

species of *Brassica*, *Raphanus* and *Sinapis* with special reference to the new requirements in Germany regarding spatial isolation in seed certification.

The results, which are tabulated and discussed in detail, show the set obtained from natural selfing and crossing; artificial selfing and hybridization, including varietal, interspecific and intergeneric crosses; and open pollination.

1269.

Hybrid castor plants possible; may boost yields, says breeder.

Crops and Soils 1951 : 3 : No. 4 : 27-28.

The proportion of female and male flowers in the inflorescence of *Ricinus communis* varies considerably, some having over 90% female flowers. Inheritance of this character has been studied and was found to be dependent on a single recessive gene. Suggestions have been made for the commercial production of F₁ hybrid seed and tests are now in progress at the University of Nebraska to determine the possible increase in oil yield.

1270.

FRIEDERICH, J. C.

Onkruidbestrijding, veredeling, zaadvorming en optreden van enkele parasitaire schimmels in olievlas. (**Weed destruction, breeding, seed production and the occurrence of certain parasitic fungi on linseed**).

Landbouwk. Tijdschr., Wageningen 1950 : 62 : 731-39.

Linseed types are classified into seven groups, which are briefly described, and breeding desiderata are discussed. Size of grain and oil content vary according to the soil. Data are given for two varieties grown on a dozen soils.

1271.

LAMAS, P. J. A.

Resultados de las experiencias con lino realizadas en la Estación Experimental Nacional de Colonia Mascias. (**Results of the experiments with flax carried out at the National Experimental Station of Colonia Mascias**).

Bol. Produc. Fomento Agríc. 1950 : 2 : No. 12 : 2-11.

Five Argentine linseed varieties are compared in respect of yield, oil output, iodine number, disease resistance and vegetative cycle.

1272.

CASTAGNOL, E. M.,

CHAVANCY, A. and

BILLAUX, P.

Étude des floraisons et fructifications des *Aleurites montana* et *Fordii*.

(**A study of flowering and fruiting of *A. Fordii* and *A. montana***).

Arch. Inst. Rech. Agron. Indochine 1950 : No. 3 : Pp. 30.

A study carried out in Indochina is reported on flowering and fruiting in the above two species, with reference to seed production and the way in which it may be affected by nutrition and by climate.

The results show that selection for high seed production should be carried out under optimum conditions of nutrition and that by proper attention to the type of soil and manuring the yield of seed can be doubled.

1273.

SELLSCHOP, J.

Sunflower varieties.

Fmg S. Afr. 1950 : 25 : 311, 320.

The sunflowers Jupiter and Mars are recommended for planting in South Africa, as a result of extensive testing. The varieties Pole Star and Southern Cross also gave satisfactory yields but large quantities of seed will probably not be immediately available. The Department of Agriculture does not however strongly recommend sunflower cultivation;

the crop is regarded chiefly as one which should be planted only after the season has advanced too far to be favourable for planting maize and groundnuts.

1274. STOJKOVIĆ, L. and
GIBŠMAN, E.
Selekcija suncokreta. (**Selection work with sunflower**).
Radovi Poljoprivred. Naučno-Istraživačk. Ustanova, Beograd 1949 : 1 :
3-10.

Breeding and selection work with sunflower at the Novi Sad Agricultural Scientific Research Station, Vojvodina, is reported.

Mass selection of the productive local varieties with a high oil extraction rate has given promising plant material which is being multiplied.

An individual family and group selection method involving the remnant system of selection has given two new varieties of sunflower, which have been released to the industry.

Novosadski 4 [Novi Sad 4] has 170 cm. tall plants with seed heads measuring 22 cm. in diameter. The seeds, 100 of which weigh 795 grm., have dark grey husks with white edges along the ribs. It is a uniformly flowering and maturing midseason variety with a growth period of 136 days. The variety is resistant to drought and *Homeosoma nebulella* and has 93% seed with a phytomelan layer. The husk content of the seed is 41.6% and oil content 59.0%. The variety was made a standard in Vojvodina.

Novosadski 8 has 225 cm. tall non-branching stems, and seed heads measuring 32 cm. in diameter. The seeds, 100 of which weigh 112 grm., are grey-striped and elongated. The variety is late maturing with a growth period of 148 days. It is uniform in flowering and maturation. The variety is resistant to *H. nebulella*, 83.0% of its seed having the phytomelan layer. The husk content is 41.1%.

1275. CLAASSEN, C. E.,
EKDAHL, W. G. and
SEVERSON, G. M.
The estimation of oil percentage in safflower seed and the association of oil percentage with hull and nitrogen percentages, seed size, and degree of spininess of the plant.
Agron. J. 1950 : 42 : 478-82.

The association of oil content with other seed and plant characters has been studied at the Nebraska Agricultural Experiment Station, using F_2 plants of the cross N-1 x N-8 and individual plant selections of the varieties Ahmednager 1 and Simla. N-1 was selected from Yenice 1813, a spineless introduction from Turkey; N-8 was derived from a spiny introduction from Texas, known as Special Russian.

Significant negative correlations were obtained between oil and hull percentage of the seed and between oil and nitrogen percentage; oil percentage and seed size showed a significant positive correlation of 0.22, oil percentage of the seed and degree of plant spininess a significant positive correlation of 0.20. Oil percentage in the kernel increased with oil percentage of the whole seed and with seed size. A method of estimating oil percentage in the seed based upon simple external examination and another based on the general appearance of a finely crushed 2 grm. sample gave respectively correlations of 0.93 and 0.90 between the estimated and actual oil percentage. This indicates that estimation of oil percentage is of value in eliminating selections with low oil content in segregating populations before oil analysis by ether extraction is performed.

1276. POERCK, R. A. DE
Contributions à l'étude du palmier à huile africain (*Elaeis guineensis* Jacq.). [**Contributions to the study of the African oil palm** (*E. guineensis* Jacq.)].
Oléagineux Rev. Gén. Corps Gras Dérivés 1950 : 5 : 623-28.

For some years the author was engaged at the National Agricultural Research Institute at Yangambi in the Belgian Congo, and in 1946 at the Leo Errera Institute of Botany,

Brussels University, in a study of the floral biology of the African oil palm from the following aspects: (1) the development of the gynecium in the flower and the development of the flower into fruit; (2) sterility in *Pisifera*; and (3) the caryology of varieties of *Elaeis*. The present paper deals only with (1) above.

It appears that fertilization occurs immediately after pollination. The growth of the fruit becomes particularly active 15 days after pollination, and ripening is completed in from five to six months.

1277. SOKOLOV, V. S.
(Some problems of alkaloid content of plants).
 Priroda (Nature) 1949 : No. 12 : 43-44.

The variability and inheritance of alkaloid content in plants have been little studied. Moreover, these problems have been approached from the Morgano-Mendelian standpoint. A correct solution of the problem is only possible by Mičurinite biology. The study of plant alkaloids is inseparable from the study of phylogeny on the basis of the systems of A. A. Grossgeim, N. I. Kuznecov, A. L. Tahtadžjan, R. Wettstein, A. Poulet, J. Hutchinson and A. Engler.

1278. CRANDALL, B. S.
Cinchona root and collar rot in Peru and Bolivia.
 Circ. U.S. Dep. Agric. 1950 : No. 855 : Pp. 16.

It is mentioned that *Cinchona Ledgeriana* is more resistant than other available strains and species of *Cinchona* which have been inoculated with *Phytophthora quininea*.

1279.
Report of the work of the Rubber Research Board in 1949.
 Rubb. Res. Scheme, Ceylon 1950 : Pp. 41.

Clonal trials at Nivitigalakele reported include: (1) the 1939 trial of 37 new local and 7 control clones; (2) the 1940 trial of promising clones of foreign origin; (3) the 1941 clearing, consisting of hand-pollinated seedlings of the 1939 programme of pollination and clone WG 6278 as control; and (4) the 1942 clearing, comprising clonal seedlings from the 1940 programme of hand pollination, illegitimate seedlings of AV 185 and clone DAR 1, and the control WG 6278.

A large scale trial was laid out at Hedigalla to test 31 clones, including NAB and Malaya clones and Tjikadoe and Prang Besar seedlings.

Clone LCB 870 has shown a high degree of resistance to *Oidium Heveae* in preliminary observations. The clone is unfortunately not a high yielder but has robust growth. Should the clone be found immune crown budding will be necessary with a high yielding centre section.

Resistance to *O. Heveae* appears to depend upon the existence of a thick cuticle on the leaves from the commencement of new leaf formation.

A detailed study of stem anatomy was made in order to find an early index of yielding capacity. Diameter and number of latex vessels were found to have no correlation with yield. The diameter of sieve tubes was small in low and moderate yielding seedlings, in contrast to clonal rubber which showed a consistently large diameter of sieve tubes. No correlation however was obtained between diameters of sieve tubes and yielding ability in the case of high yielding trees exhibiting small differences in productivity. Clone LCB 870 showed large sieve tube diameter but was characterized by a medullary ray which in tangential view was larger than that in samples of other clones; this aspect of stem anatomy is being further explored. In the investigation of an early index of yield the study of stem anatomy is to be combined with analysis of the latex content of the leaves.

1280.

The Rubber Research Institute of Malaya. Report for the period January 1941 to August 1945.
Kuala Lumpur 1950 : Pp. 108.

Increases in yield are noted in the reports of clone tests continued during the war years. An account is given of breeding progress using hand pollination methods by which yields were improved in the families A 44 x B 84 series 1, A 44 x Lun. N series 3 and B 84 x G 1 1 series 7. The outstanding yields of the illegitimate seedlings of PB 49 are probably correlated with variation in soil fertility.

1281.

SCHWEIZER, J.
Aanbevolen heveaplantmateriaal 1950/51. (**Recommended planting material of rubber 1950-51**).
Bergcultures 1950 : 19 : 417-21.

Descriptions are given of clones and seedlings recommended to planters in Java. Approved stocks include some *Hevea spruceana* hybrids.

1282.

KOZŁOWSKA, A.
Studia nad włoskami wydzielniczymi kamforodajnego *Ocimum canum* Sims, *Ocimum sanctum* L. oraz ich mieszańców. (**Studies on the secretory hairs of the camphor bearing species *O. canum* Sims and *O. sanctum* L. and their hybrids**).
Acta Soc. Bot. Polon. 1949-50 : 20 : 223-45.

The systematic morphological and anatomical characteristics of the above species and of their F_1 hybrids are described. Under conditions permitting cross pollination between plants of the two species the hybrid *O. canum* x *O. sanctum* occurred more frequently than the reciprocal, which was not only rarer but differed morphologically from the former hybrid. This may be due to the anomalies in the development of the pollen in *O. canum* described by Gołubiński. Characters of the hybrids were generally intermediate between those of the parents, but not in the case of the calyx. In *O. sanctum* the lower lip of the calyx lengthens after the setting of seed, in *O. canum* this does not occur. In the case of the hybrids, after the setting of seed, both these types of calyx were found; the majority of the calices, especially in the *O. canum* x *O. sanctum* hybrids, were like those of *O. canum*, but other hybrid plants exhibited calices with the elongated lower lip. The F_2 from the hybrids formed few seeds. *O. canum* x *O. sanctum* was the only hybrid studied further. The morphological characteristics of secretory glands of the two species and their hybrid were studied. Four types of secretory glands were classified and their reaction to various stains are described. In the case of the hybrid, on staining the living secretory glands of type II with methylene blue of concentration 1 : 10,000, a mosaic effect was observed. Some of the glands turned blue almost at once, as was the case with the glands of *O. sanctum*; others remained colourless like those of *O. canum*. Biochemical study of these reactions indicates that there are two kinds of secretory cells one with a low and the other with a relatively high oxidation-reduction potential. These differences are probably related to the fact that the essential oil from *O. canum* contains 59% of camphor, whereas, according to previous work, the essential oil of *O. sanctum* contains 80% of the methyl ether of p-allylanisole.

FRUITS AND NUTS

1283.

KINMAN, C. F.
Report of the committee on new fruits and nuts for 1947.
Proc. Sixty-second Convent. Amer. Pomol. Soc. 1948 : 158-210.

Information is given on the origin and characteristics of apple, crab apple, pear, plum, peach, apricot, cherry, grape, raspberry, strawberry, currant and tung varieties. The report, although incomplete, covers many of the varieties appearing since the last list published by the American Pomological Society in 1943.

1284. KINMAN, C. F.
Report of the committee on new fruits and nuts for 1949.
 Proc. Sixty-third Convent. Amer. Pomol. Soc. 1948 : 190-214.

Additional varieties of nectarine, peach, apricot, plum, cherry and grape are described (cf. Abst. 1283).

1285. SPINKS, G. T.
Progress Report on fruit breeding 1949.
 Rep. Agric. Hort. Res. Sta. Bristol 1949 : 31-33.

Apple

The new variety Cheddar Cross, a hybrid between Allington Pippin and Star of Devon, has been distributed. It is a dessert apple with an attractive appearance, ripening before Worcester Pearmain. Another seedling from the same cross, A SD 3, is receiving further trial. Three seedlings from a cross between Worcester Pearmain and Beauty of Bath show promise as varieties to precede Worcester Pearmain in season but require further trial. In cider apple breeding seedlings have been raised from crosses between Stoke Red (sharp), and the three varieties Frederick (sharp), Yarlinton Mill (bitter sweet) and Medaille d'Or (bitter sweet) with a view to developing new varieties of the sharp and bitter sweet kinds.

Pear

A promising seedling with the same parentage as Cheltenham Cross (Dr. Jules Guyot x Conference) is under trial. It may prove to be as good as Cheltenham Cross (*Plant Breeding Abstracts*, Vol. XVIII, Abst. 1139); it has the same time of maturity, viz. mid September, as this variety but differs in shape and colour. In continuation of the search for good late varieties two more families have been raised by crossing two late unnamed seedling varieties with Doyenné du Comice.

Plum

Work on the production of improved early varieties has begun. Early Laxton has been crossed with a fairly early seedling of better quality than Early Laxton but rather poor cropping capacity.

Black currant

A seedling selected from the second generation of Boskoop selfed has been propagated for trial on a larger scale; it appears to be a heavy cropper and somewhat later in season than Malvern Cross (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1139). Several other new varieties are still under trial but it is doubtful whether they are equal or superior to varieties already named. In 1947 crosses were made between Baldwin and Malvern Cross and between Baldwin and BV 140 (a late seedling of Baldwin x Victoria) in the hope of developing a late variety high in vitamin C content.

1286. IVANOV, P. P.
(The originators of new varieties).
 Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 5 : 14-18.

The results of Mičurinite breeding work with pome and stone fruits and small bush fruits at the Moscow Fruit Research Station are reported. Some of the work has been reviewed already (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1115 and Vol. XXI, Abst. 632).

Mention is made of the most recently selected apricots Mindaljnij [Almond] and the varieties 6 and 7, all of which are sufficiently hardy for outdoor cultivation in the Tambov and Voronež provinces.

The new varieties of cherry, Smena [Change], Podmoskovskaja [Moscow] and Birjulevskaja, obtained from crosses between hardy cherries and southern varieties, are under trial.

Promising new plums were obtained by crossing Renklod Zelenij [Green Gage], Victoria and other southern varieties with hardy local varieties. These include Pamjatj Timirjazeva [Timirjazev's Memorial], Izobiljnaja [Abundant], Želtaja Desertnaja [Yellow Dessert] and the varieties 1-44 and 1-60.

1287. LESLIE, W. R.

Hardy varieties of fruit.

Trans. Ia Hort. Soc. 1949 : 84 : 80-85.

Hardy varieties of apple, pear, plum, apricot, cherry, strawberry and grape, which have been produced at the Dominion Experiment Station, Morden, Manitoba, are listed and described. Some of the hardy characters of cherry varieties from Korea and Manchuria and of apples from Russia have been introduced into varieties grown commercially in Canada.

1288. YEAGER, A. F.

Breeding improved horticultural plants. II. Fruits, nuts and ornamentals.

Bull. N.H. Agric. Exp. Sta. 1950 : No. 383 : Pp. 16.

Breeding carried out on fruits, nuts, woody ornamentals and flowers in recent years at the New Hampshire Agricultural Experiment Station is surveyed.

Apple

Crosses have been made between Winter Banana and McIntosh and between Northern Spy and Macoun in the hope of developing a variety with high quality, good yielding capacity, red colour and ability to keep longer in the spring than McIntosh. Seeds have been obtained from the cross between a natural tetraploid of McIntosh and Winter Banana, using pollen of the latter variety.

Pear

Hybrids between Clapp's Favorite and Conference are being selected to secure a variety with the desirable qualities of Clapp's Favorite but which will ripen during winter instead of in August.

Peach

Crosses involving Oriole, Eclipse, Cumberland and Vedette are under selection; early elimination of unwanted seedlings which would produce white fruits has been possible on the basis of the colour of young seedlings before they emerge from the soil and colour of the leaf veins.

Nuts

Specimens of butternut and hickory nut raised from local seed samples are under observation. A population from seed of the hazel Winkler, probably largely the result of pollination by filbert-hazel hybrids, and another population from seed of the filbert-hazel hybrid variety Jones, probably largely the result of pollination by Winkler, may yield hardy selections showing improvements as regards nut size and earliness of maturity compared with Winkler.

Rubus

Durham, probably a parthenogenetic seedling of the raspberry Taylor, produces a larger autumn crop than any other variety tested at the Station (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2074). Crosses have been made between Taylor and *R. odoratus* and between the blackberry Snyder and *R. odoratus*; it is hoped that the thornlessness and disease resistance of *R. odoratus* will be incorporated in new high yielding varieties. Promising hardy F_2 and F_3 selections of crosses between Taylor ($2n = 14$) and the bake apple berry ($2n = 56$) have been produced.

Blueberry

The low bush blueberry (*Vaccinium pennsylvanicum*), although no hardier than the high bush type (*V. corymbosum*), escapes injury in severe winters because the plant is covered with snow. Crossing between the two species has therefore been undertaken with the aims of producing a commercial variety intermediate in size; promising F_1 plants have been secured which may be valuable in themselves; an F_2 generation of seedlings is being grown in the hope of obtaining plants about 2 ft. high, which produce large, bright blue fruits and propagate by stolons. Selections of native high bush blueberry found in New Hampshire, where the species reaches the northern limit, have been crossed with unnamed selections of

cultivated blueberry developed by the US Department of Agriculture in New Jersey with the aim of producing hardier commercial varieties.

Strawberry

A promising seedling from a cross between Simcoe and Catskill was named Great Bay in 1948 (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 665). Good seedlings have been secured by crossing Fairfax and Tupper, a very late, large fruited Canadian variety. Selections of wild strawberry are being used in breeding; first generation hybrids between these selections and cultivated varieties are very vigorous, high yielding plants, producing fruits of intermediate size and acceptable quality; back-crossing is in progress to improve fruit size.

Grapes

Earliness is the main objective of breeding. Open-pollinated seedlings of Erie, a variety which does not produce pollen, are to be selected in the hope of developing extra early, hardy and self pollinating varieties with good quality.

1289.

(To a bolder introduction of the achievements of science into industry).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 5 : 3-8.

A critical survey of Mičurinite activities in horticulture includes a list of Soviet prize winning plant breeders who bred and introduced into industry new varieties of various fruits. The scientists of Mičurinsk and Novočerkassk were criticized at a conference held in 1950 under the auspices of the Ministry of Agriculture for Russia, for divorcing their work from practical horticulture.

1290. CRANE, M. B.

The origin and improvement of cultivated plants.

J.R. Hort. Soc. 1950 : 75 : 427-35.

An account is given of the role of genic mutation, autopolyploidy, interspecific hybridization and interspecific hybridization accompanied by chromosome doubling in the origin of horticultural plants.

1291. FLOOR, J.

De zaailingonderstam. (**The seedling stock**).

Meded. Inst. Vered. Tuinbouw. Wageningen 1950 : No. 18 : 11-13.

FLOOR, J.

De tussenstam. (**The intermediate stock**).

Ibid. 1950 : No. 18 : 14-15.

In discussing the merits of seedling and vegetatively multiplied stocks for cherries, plums, apples and pears, it is pointed out that triploid seedlings are undesirable, diploid being better. Clonal seed grafted with a very productive scion gives very uniform yields because there is no room for more fruit than is produced on the less productive stocks. When a seedling has been grafted with a vigorous variety, e.g. Bramley, to give a good stem and this is grafted with a less vigorous grower, e.g. Cox, the result may be quite unsatisfactory after a year or two as the top graft cannot support the root system developed by the influence of the intermediate.

1292. GOLUBINSKIĬ, I. N.

(**The effect of the petals upon the growth of pollen grains**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 3 : 19-21.

Ukrainian investigations on the stimulation of pollen growth of different plants, including pome and stone fruits, are described.

Pollen viability was improved and the growth of the pollen tubes intensified by (1) thicker sowing of the pollen in nutrient solutions and by the addition to the solutions of stigmas of the same species, (2) adding petals or whole flowers to 15% sugar solutions in Petri dishes (in the case of the pollen of *Prunus insititia* distilled water was used instead of the sugar solution), and (3) growing the pollen in atmospheres permeated with exhalations of flowers of the same species or other species. The effects of petals or whole flowers upon pollen viability and the growth of pollen tubes are recorded. With the exception of *Prunus Padus* pollen, where the treatment had the opposite effect, higher percentages of pollen germination and elongations of the pollen tubes were obtained.

The technique used for the exposure of the pollen to the action of floral exhalations consisted of placing Petri dishes, with or without lids, containing the pollen and distilled water among the flowering branches of plants of the same species, or among the branches of blooming lilac. The percentages of germinating pollen and the lengths of pollen tubes obtained as a result of the treatments are shown for wild crab, the pear Lesnaja Krasavica [Forest Beauty], *P. Padus* and the black currant Lija Plodorodnaja [Productive Lija]. The best results were obtained when open Petri dishes containing the pollen were surrounded with flowers of their own species.

1293. EREMEEV, G. N.

(Fruit trees in protective forest belts).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 3 : 6-8.

In experiments at the Nikita Botanical Garden, apple, pear, apricot, peach, myrobalan and almond grown outdoors from seed were more vigorous and resistant to drought than seedlings transplanted from glasshouses. Planting these trees by the cluster method in protective forest belts is recommended. The apple varieties Kandilj Sinap [Candille Sinap], Sary Sinap [Yellow Sinap], Aport, Borovinka, Renet Zelenyi [Green Reinette] and various forms of Anis are regarded as particularly suitable for the purpose, as according to Mičurin their seed progeny retains the properties of cultivated varieties.

1294. PORTNOI, L.

(Work which must not be permitted!).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 7 : p. 79.

Claims made by L. D. Makeev that new varieties of fruit trees can be bred by using lime, alder, birch, poplar and fir as mentors are rebutted.

It is stated that an investigation conducted by the Leningrad Fruit Research Station and by the RSFSR Ministry of Agriculture established that Makeev in fact did not possess any plant material which had the properties or was obtained in the manner he described.

The present writer mentions that the circle of Makeev's "followers" is increasing and that Makeev continues to send his hybrid plant material to nurseries and plant breeding institutes; he urges that these activities be stopped.

1295. B., N.

Impollinazione delle varietà di meli e di peri. **(Pollination of varieties of apples and pears).**

Riv. Ortoflorofrutticolt. Ital., Firenze 1950 : 34 : p. 129.

Recommendations are made for ensuring successful pollination in orchards. Triploids produce little and inferior pollen; and bud mutants are not fertilized by pollen from the parent variety.

For a complete description of the varieties of apples and pears and information on their pollination and chromosome constitution reference is made to the Transactions of the National Congress of Fruiculture, Ferrara.

1296. CRANG, A. and
KENDALL, L.
The inactivation temperatures of the oxidase enzymes in plums and apples.

Rep. Agric. Hort. Res. Sta., Bristol 1949 : 163-67.

Varietal differences have been noted in the temperature required to inactivate the enzyme system responsible for the browning of plums and apples upon exposure to the air after processing.

1297. LESJUK, E. A.
(**Apple varieties of I. V. Mičurin**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 6 : 10-15.

Two apple varieties bred by Mičurin and developed after his death at the Central Genetical Laboratory are described.

Kaljvilj Anisovyĭ [Anis Calville], from Anis Barhatnyĭ [Velvet Anis] x Kaljvilj Krasnyĭ Zimnii [Red Winter Calville], grows well in the central belt of Russia. It has a short growth period and is as hardy as Antonovka Obyknovennaja [Common Antonovka] and Anis Alyĭ [Crimson Anis]. The variety is productive and comes into bearing in the sixth to eighth year. The variety shows better resistance to scab than the central Russian varieties. The fruits, weighing 120 grm. to 190 grm., are firmly attached to the tree. They have good consistency and flavour, and are picked in September but reach full maturity during storage. The fruit has good keeping and processing properties.

Borovinka Novaja [New Borovinka] was selected for its hardness. It bears fruits weighing between 108 grm. and 163 grm., and of a regular but flattened form; the skin is yellow with red stripes. The flavour is superior to that of the common Borovinka. The fruit reaches maturity in August. The new variety is early bearing, productive and shows greater resistance to scab than Borovinka.

Other varieties developed from Mičurin's material are mentioned. Some of them have been made standards, others are still under trial.

1298. KORDON, R. JA.
(**Apple varieties for the northwestern zone of the RSFSR**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 7 : 22-24.

Selection work with apples and trials of varieties suitable for cultivation in the Leningrad province are reported from the Pavlovsk Base of the USSR Institute of Plant Industry.

The new varieties developed at the institute include Paškeviča Krasnoe [Paškevič's Red], Krjukovskoe, Ljubimica Tarasenko [Tarasenko's Favourite], Sigovskoe, Kordonovka [Kordon] and Novogodnee [New Year], all of which were obtained from seed of the Mičurin variety Beljfler Kitaika [Bellefleur Chinese Crab]. The new varieties are hardy and resistant to pests and diseases. Paškeviča Krasnoe is an early autumn variety. It comes into bearing in its sixth or seventh year and is a moderately good cropper. The fruits are large and flattish. The skin is dark red superposed on pale yellow. The flesh is white and has a good flavour. The fruits keep until November.

Krjukovskoe is a late autumn variety bearing in the sixth year after planting. It gives a good crop of medium large conical fruits. The skin is pale yellow with brick red cheeks. The flesh is juicy and has a good flavour. The fruits keep until December.

Ljubimica Tarasenko is a vigorous late autumn variety, bearing for the first time in its sixth or seventh year. It is productive. The fruits are large and flattish or truncated conical. The skin is raspberry red superposed on pale yellow. The flesh is firm, yellowish, juicy and has a good flavour. The fruits keep until November.

Sigovskoe is a late autumn variety whose fruits keep until December. It bears in its sixth or seventh year and is productive. The fruits are medium large and flattish. The skin is greenish yellow, sometimes with pale red cheeks. The flesh is white, juicy and has a good flavour.

Kordonovka is a vigorous late autumn variety whose fruits keep until January. It bears a good crop in its sixth or seventh year. The fruits are of good size and are uniformly greenish yellow. The flesh is offwhite, juicy and sweet.
Novogodnee is a vigorous, early winter variety. It yields a good crop in its seventh or eighth year. The fruits are medium large and conical or truncated oval. The skin is attractive dark red superposed on greenish yellow. The flesh is firm and juicy and has a good flavour. The fruits keep until February.

1299. TARALA, G. N.

(A hobby).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 7 : 29-30.

Reference is made to three apple varieties obtained by the present writer at Barnaul, Siberia, by seedling selection.

Zelenoe [Green] is an annual-bearing variety reaching maturity on 1 September. The fruits have a good flavour and weigh 100 gm. each.

Velikan [Giant] reaches maturity in mid December. The fruits are white, weigh 90 gm. and have a good flavour.

Boljšoe [Large] reaches ripeness in mid September. The fruits weigh 140 gm. and have a good flavour.

1300. SMIRNOV, V. F.

(Moscow's Mičurinites).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 6 : 38-42.

The activities of the Mičurinite Section of the Moscow Society for the Development of Green Belts include selection and breeding of new fruits.

Mention is made of several new varieties developed by the members of the society or other Mičurinites engaged in selection work at various Soviet institutes.

The new apple varieties include: Mir [Peace], bred by Zinčenko; Vitino [Vitja's] and Dačnoe [Summer House], selected by Komissarov; varieties 1 and 2 developed by Karpovič; Desertnoe [Dessert] bred by Petrov; the seedling varieties P-20-5, 1-18-3, 36 and 3-14-55 developed by Isaev, and Mleevskaja Krasavica [Mleev Beauty], Osennee Zolotoe [Autumn Gold] and various seedlings developed at the Mleev Fruit Research Station.

New pear varieties, bred by Popov, Šidenko, Efimov, Enikeev and Venjaminov are mentioned.

References are made to a new cherry variety 1 bred by Petrov, to a very early red currant selected by Popov and to grape varieties bred by Evdokimova for the Moscow province.

1301.

New varieties of fruits and some old ones.

Trans. Ia Hort. Soc. 1949 : 84 : 117-21.

A brief report on several old varieties of apple is supplemented with short descriptions of several new varieties produced by the Iowa station; these include Sharon, Secor, Joan and Hawkeye Greening, which are all high yielding.

1302. ALEKSANDROV, F. A. and

GEŽOVSKAJA, O. A.

(Mičurinite horticulturists of the Gorjkov province).

Sad i Ogorod (Fruit and Vegetable Gardens) 1949 : No. 8 : 62-63.

Mičurinite selection work with stone and pome fruits and grapes in the Gorjkov province is briefly surveyed. The following varieties were developed recently.

Apples

Buketnaja [Bunch] was obtained from Borovinka x Korobovka [Basket]. It is a productive and hardy autumn variety. The fruits are of good quality and grow in clusters of five to six. Some fruits develop from the fusion of two.

Pamjatj Julii [Julia's Memorial] was derived from a cross between Antonovka and Korobovka. Tarasovka [Taras] was developed by hybridization between Mičurin and local varieties. Promising hybrids were also obtained from crosses between Beljfler Kitaika [Bellefleur Chinese Crab] and English Pippin and between the former and Anis Rozovopolosatyi [Pink Striped Anis].

Stone fruits

Reference is made to a promising new hybrid between the sloe and Želtaja [Yellow] plum and to a new large fruited sloe.

Grapes

Hardy productive varieties were selected from seedlings of the Mičurin varieties Černyi Krupnoplodnyi [Black Large Fruited] and Metallicheski [Metallic]. The new varieties grow well without screening in the Lukojanvskii district.

1303. ČERNENKO, S. F.

(**Suvorovec, a new apple variety**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 6 : 20–23.

Suvorovec [Suvorovite] was derived from Antonovka x Renet Simirenko [Simirenko's Reinette]. The hardier parent, Antonovka, was used as a mentor to improve the hardiness of the hybrid. It is a late season variety with good keeping properties. The variety bears large well-shaped uniform fruits weighing 150 grm. to 180 grm. The fruits are remarkable for their exceptionally small core, i.e. 1.7 mm. x 3.2 mm. They are greenish yellow with small subepidermal dots and smooth surface. The skin is thin. The flesh is offwhite and has good consistency and flavour. The variety is resistant to fungous diseases.

1304. SPIRINA, V. V. and

MEDVEDEV, P.

(**Apples in the eastern part of the Vologda province**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 2 : 14–18.

In trials conducted at Nikoljšk the following apples were selected.

Vegetativnyi Gibril [Vegetative Hybrid] was obtained by grafting a European variety on a Siberian Crab stock. Its fruits are attractive, have a good flavour and weigh 80 to 90 grm. The trees are hardy, moderate in requirements, productive and early bearing. Some 6 year-old trees yield up to 15 kg. each. Ranetka Purpurovaja [Purple Reinette] was bred in Siberia from Siberian Crab cross-pollinated with a European variety. It bears small tart purple fruits which are picked in September. The variety is hardy, productive, early bearing and resistant to scab.

Antonovka Kitaika [Antonovka Chinese Crab] was selected from seedlings grown from a hybrid seed sample sent from Syzranj. The fruits weigh between 70 and 90 grm. and have the good flavour of Antonovka. They mature in mid October. The variety is resistant to scab and moderately so to cold. The trees come into bearing in the sixth or eighth year. Koričnoe-Kitaika [Brown Chinese Crab] was obtained from fertilizing the cultivated Chinese Crab with the pollen of Koričnoe [Brown] sent to Siberia from Syzranj. The fruits weigh 30 to 40 grm., have the appearance of the Chinese Crab and the flavour of Koričnoe and can be used for making preserves and for eating fresh. The variety reaches maturity in September, is hardy, productive, resistant to scab, and an early bearer.

Sejanec Ernakka [Seedling Ermak] was selected from seedlings of the Mičurin variety Ermak. The fruits, picked in October, are very small but have a good flavour and can be eaten fresh as well as used for making preserves. The variety is productive and hardy. Sejanec Pepina [Pippin Seedling] was obtained from Pepin Litovskii [Lithuanian Pippin] originating from seed sent from Syzranj. The variety bears fruits which are outstanding in the eastern part of the Vologda province for their quality and appearance. The fruits, growing in pairs, weigh over 60 grm., are ribbed and in shape resemble the turnip. Their skin colour is yellow with fine red dots and stripes. The fruit stalks are long. The flesh is white, finely granular and juicy and has a good flavour. The yield is between 40 and 50 kg. per tree. The variety reaches maturity at the beginning of October. Other varieties

which are referred to as promising include some Mičurin varieties, and Renet Sibirskii Krupnoplodnyi [Siberian Large Fruited Reinette], Nikoljskoe [Nikoljsk] and Petrjaevskoe Osennee [Petrjaevo Autumn].

1305. ČIRKOV, V. I.

(**The viability of seed of some apple species**).

Botaničeskii Žurnal (Botanical Journal) 1950 : 35 : 387-94.

Most of the seed of the apple hybrid *Malus prunifolia* x *M. baccata* was viable and produced healthy seedlings when fruits containing the seed were exposed to the natural effects of cold and snow before the seed was sown out of doors. Instances are reported of clusters of 6 to 9 healthy seedlings developing from the seed of fallen fruits under natural conditions. The development of the plants in the cluster formed by each individual fruit is regarded as evidence against the assumption of competition between individuals of the same species. The method is recommended for the planting of seed of various *Malus* spp. on permanent locations in orchards, where the trees can later be improved by grafting, and in forest belts.

1306. SKOROV, R. P.

(**A vegetative apple**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 3 : p. 75.

An apple variety producing parthenocarpic fruits is described. Two 50 to 60 year old trees of this variety were found in 1947 at Plastanovskaja Staniča, Krasnodar territory. The fruits develop without the buds bursting. They are conical, larger on one side than the other and ribbed at the distal end. They weigh 70 grm. and have bright red markings on a greenish-yellow skin.

The core is thick and contains empty seed cavities. An extension of the core is found below the first core. This contains portions of an undeveloped ovary. The flesh is soft, offwhite, juicy and has a good flavour. The variety is productive, an annual bearer and reaches maturity in July. The fruit does not keep.

1307. ČERNJAEV, I. P.

(**Tavlinka, an apple of the Caucasian highlanders**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 8 : p. 75.

Tavlinka, an ancient north Caucasian variety and a standard for the Stavropolj territory, is regarded as useful material in hybridization. The variety has a short stem rather like Pepin Šafrannyi [Saffron Pippin] and Wealthy. It is early bearing, productive and hardy. The branches grow at right angles and resist breakage under the weight of snow or in the wind.

The fruits are small but have an attractive appearance. The flesh is white, firm, juicy and has a good flavour even after long storage.

The variety is resistant to scab and pests.

1308. LISAVENKO, M. A.

(**To continued progress in Siberian horticulture**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 1 : 3-11.

Agricultural research institutes in Siberia should pay greater attention to breeding apples for hardiness and larger fruit. Pepin Šafrannyi [Saffron Pippin], Pepin Kitaika [Pippin Chinese Crab], Šafran Kitaika [Saffron Chinese Crab] and Pepin Litovskii [Lithuanian Pippin] are varieties regarded as adapted to cultivation in prostrate form under Siberian conditions.

The raspberry variety Visluha [Drooping] yielding 50 c. of good fruit per ha. under Altai conditions is referred to. The variety possesses greater resistance to drought than Novostj Kuzjmina [Kuzjmin's Novelty].

1309. CUTHBERTSON, J. D. and
STICKLEY, R. M.
**The production of cider fruit on bush trees. Observations on
yields, 1945-49.**
Rep. Agric. Hort. Res. Sta. Bristol 1949 : 25-30.

Data are given on the cropping behaviour of cider apple varieties grown as bush trees at county trial centres in the west of England, the Long Ashton Research Station and in Kent.

1310. REIMER, F. C.
Development of blight resistant French pear rootstocks.
Sta. Bull. Ore. Agric. Exp. Sta. 1950 : No. 485 : Pp. 24.

Although most French pear rootstocks are susceptible to *Erwinia amylovora* blight, a few resistant seedlings were obtained from inoculation trials and pollinated by the highly resistant variety Farmingdale. Vigorous, blight resistant seedlings for use as rootstocks were obtained from the crosses P18 x Farmingdale, W1 x Farmingdale and Burkett x Farmingdale.

1311. KUZNECOV, V. V.
(Promising varieties of quinces in Uzbekistan).
Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 1 : 29-31.

The more promising varieties of quinces selected in Uzbekistan are described.

Serin is an early variety maturing in mid September. It bears pear shaped, pubescent fruits weighing between 130 and 180 gm. The flesh is soft, granular and sweet, and has a satisfactory flavour. The variety is productive. The fruits, used mostly fresh for the table, cannot be kept for more than a month.

Nordon bears a heavy crop of fruits possessing good flavour and keeping well during storage and transport. The trees have a semi-upright habit and reach a height of 4 to 5 m. The branches and foliage grow vigorously. The hairy fruits weigh 140 to 200 gm. The flesh is offwhite, moderately firm, crunching, aromatic and has a good flavour. The fruit matures in September to mid October and keeps in storage until the end of December. The variety can be propagated by offshoots.

Kuvinskaja Obyknovennaja [Common Kuvinskaja] is a medium maturing table variety. The tree is a tall bush reaching a height of 5 to 6 m. with a stem diameter between 35 cm. and 40 cm. The variety bears in the third or fourth year after planting, the fruits being hairy, apple shaped and weighing 150 to 180 gm. The flesh is firm, juicy, white and sweet and has good flavour. The variety is productive and an annual bearer. The fruits, mostly eaten fresh, keep for three months in storage.

Kzyl-Kurganskaja [Red Kurgan] is a medium maturing variety suitable for eating fresh and for processing. The trees are tall and have well developed crowns and the fruits are large and pear shaped. The fruits from young trees weigh 250 to 280 gm. but individual fruits borne by older trees weigh as much as 620 gm. The hairs can be detached with ease from the fruits. The flesh is soft, with a yellowish tinge and good flavour. The fruits are harvested in October, after which they keep until the beginning of January.

Turuš is a late maturing variety suitable for processing. The trees are medium tall with a wide flat circular crown. The fruits weigh 150 to 180 gm. The hairs are thick but detachable when the fruit is mature. The flesh is white with a yellow tinge, firm, and a little coarse but has good flavour. The fruit is harvested in October and matures in storage where it is kept until December. It is transportable and keeps well until February. Kuvinskaja Krupnoplodnaja [Large Fruited Kuvinskaja] is a high bush reaching 7 m., with a wide spreading crown. It branches sparsely and has moderately thick foliage. The fruits are pear shaped and weigh 250-300 gm. and on some older trees as much as 600 gm. The pubescence is removable. The flesh is pale yellow, moderately firm, juicy and has good flavour, which improves after storage. The trees bear 6 to 8 years after planting and are annual bearers. The fruit is harvested in October and can be kept in storage for over two months. It is used fresh and for preserving.

Samarkandskaja Krupnoplodnaja [Large Fruited Samarkand] is a tall bush reaching 6 to 7 m. The fruits are rough-skinned, hairy, pear shaped, and weigh between 250 and 300 gm. The flesh is yellow and paler near the core than on the outside. Its consistency is granular and coarse, but the flavour is good. The variety bears 5 to 6 years after planting, and is a good annual bearer with particularly heavy cropping every other year. The fruit matures in October and keeps in storage until February.

1312. VOLKOV, S. A.

(Apricots cultivated in the Primorskii territory).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 7 : 24-26.

The apricot varieties best adapted to cultivation in the Soviet Far East are described. Bai is an annually bearing local seedling variety. The parent tree grows in an orchard at Sedanka and produces about 1500 fruits every year. The fruits weigh 32-40 gm., are yellow with red cheeks, and have a soft, sweet flesh. The tree and the fruit show resistance to pests and diseases. The variety reaches maturity on 3-5 August. Fruit setting is normal even under unfavourable weather conditions. Bai is regarded as the best dessert variety in the Primorskii territory.

Sedanskii Titova was obtained from a tree planted by Titov in the grounds of the Sedanskaja School. It has been in bearing for over 20 years, during which period it has suffered no injury from cold. The fruits weigh 25 gm. and have a good flavour. They are uniformly pale orange and mature on 1-3 August.

Podarok Gornjaka [Miner's Gift] (= Zinčenko) was developed at Sučan. It has flattish fruits weighing 30 gm. The fruits are bright orange with bright red dotted cheeks. The flesh is juicy and has a good flavour. The fruits are ripe on 8-10 August. The variety is sufficiently hardy for the Sučan district, but is susceptible to injury from cold in other districts.

Local apricot varieties 3 and 4 were developed at the Far Eastern Research Station of the USSR Institute of Plant Industry. Both varieties are hardy and do well in the southern districts of the Primorskii territory. They have yellow fruits weighing 29-31 gm. The flesh is firm and has a good flavour. The stones are free. Variety 4 reaches maturity on 3-5 August and variety 3 on 10-13 August.

Elovickogo Pozdñii [Elovickii Late] is a hardy variety with the large leaves of the central Asiatic apricots. The variety is resistant to pests and diseases and reaches maturity on 15-18 August. It bears fruits weighing 30-32 gm. The flesh is firm, sweet and has a good flavour.

1313. RICCI, A.

Un'ottima pesca precoce: Madame Kira Evreinoff. (An excellent early peach, Madame Kira Evreinoff).

Riv. Frutticolt. Viticolt. Oricolt. 1950 : 12 : 239-42.

This clingstone peach, which is a bud mutation of Fior di Maggio (Mayflower), is one of the best peaches for the province of Ravenna.

The tree, fruit and flower are described and illustrated. The variety is resistant to *Coryneum* and highly resistant to cold and to late frosts. It is self fertile and an excellent pollinator. Its fruit is rather large, round and symmetrical, with a moderately deep furrow and delicate cream skin tinted and striped with deep pink. The flesh is greenish white, sweet and of high quality. It ripens at the end of June and the beginning of July, from two to three days after Amsden and almost at the same time as Bella di Roma Precoce [Early Roman Beauty].

1314. BOLONJAEV, A. V.

(A new valuable variety of apricot for the north).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 8 : 52-53.

Selection of apricots grown from stones of cultivated Manchurian varieties at Habarovsk in the Soviet Far East has given a hardy, productive and early bearing variety, Samyĭ Severnyĭ [Northernmost].

Samyĭ Severnyĭ has small round to oval fruits of uneven shape which weigh 18.6–25 gm. The shallow groove is clearly visible along the entire length of the fruit. The skin is soft, golden yellow and with red cheeks. The flesh is 8 mm. thick, orange, firm, sweet, juicy and has a good flavour. The stone is free. The variety is susceptible to dropping after the fruits reach maturity on 2 to 6 August. The fruits keep only a few days before losing their good flavour.

1315. PEYNAUD, E.

L'acide ascorbique (vitamine C) dans les prunes. [**Ascorbic acid (vitamin C) in plums**].

Rev. Hort., Paris 1948 : **120** : 111–13.

The ascorbic acid content of 34 varieties of plums is shown in a table which also gives the colour and weight of the fruit and the date of picking.

1316. BALDINI, E.

Contributo allo studio dell'impollinazione del ciliegio. (**A contribution to the study of pollination of the cherry**).

Riv. Ortoflorofrutticolt. Ital., Firenze 1950 : **34** : 200–08.

The results are recorded of a study begun in Italy in 1949 of germination capacity, pollination and fertilization in 15 varieties of cherry. The compatibility relationships of the varieties were also investigated.

1317. KRJUKOV, F. A.

(**Plum varieties for the Leningrad province**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 6 : 23–27.

Breeding work with plums at the Pavlovsk experimental base of the USSR Institute of Plant Industry is reported. Descriptions are given of some of the varieties which showed promise in trials including four new ones. The first three of these were obtained by free cross pollination of Černosliv Kozlovskii [Kozlov Prune], while the fourth, Jubileĭnaja [Jubilee] was grown from seed of Renklod Aljtana [Altana Gage].

Pavlovskaja Golubaja [Pale Blue Pavlovsk] is productive, hardy and resistant to pests and diseases. It reaches maturity in September. The fruits are dark blue with a pale blue waxy bloom and weigh 28.2 gm. The flesh is yellow, firm and juicy. The stone is free. Alenuška [Little Alena] is productive, hardy, resistant to pests and diseases, and vigorous. The fruits reach maturity in September. They are oval and mauvish raspberry to dark blue in colour with a pale blue bloom. The fruits weigh 36 gm. Their flesh is yellow, tender, juicy and sweet. The stone is loosely attached to the flesh.

Osennjaja Krasnopaharskaja [Autumn Krasnyi Paharj] is a vigorous, productive and hardy variety showing resistance to pests and diseases. It reaches maturity in September. The fruits are oval, blue with a pale blue bloom, and weigh 10.4 gm. The flesh is greenish yellow and has good consistency and flavour. The stone is not entirely free.

Jubileĭnaja [Jubilee] was recently derived from Renklod Aljtana [Altana Gage]. It is hardy, productive and resistant to pests and diseases. The variety reaches maturity in August. The fruits, each weighing 30.7 gm., are round, of raspberry colour, and with a bloom and light brown dots. The flesh is yellow, and has a good flavour. The stone is free.

Aksenovskaja [Aksenov] was bred at Staraja Russa from unspecified parents. It is a hardy and productive variety reaching maturity in mid September. The fruits are oval, or round, and dull red with a faint bloom. They weigh 16.5 gm. Their flesh is yellowish pink and has a good flavour. The stone is small.

Vengerka Zimovka [Winter Hungarian] is a central Russian variety. It reaches maturity in mid September. The fruits are oval, brownish red to mauve, with a waxy bloom and have small brown subepidermal dots. They weigh 25.5 gm. and have a yellow flesh of good consistency and flavour. The stone is free and small.

Kurčavaja [Curly] is productive and hardy. It reaches maturity in mid September. The fruits are oval, dark lilac with yellow subepidermal dots, and weigh 27.8 gm. The flavour is good. The stone is loose.

Mirabelj Krasnopaharskaja [Krasnyĭ Paharj Mirabelle] is a hardy and productive variety which is resistant to pests and diseases. It reaches maturity in September. The fruits are round, greenish yellow with subepidermal dots all over the fruit, but reddish close to the stalk and on the sides facing the sun. They have a waxy bloom and weigh 15.5 grm. The flesh is yellow and has good consistency and flavour. The stone is free.

Leningradskaja Sinjaja [Blue Leningrad] is an ancient variety also known as Perdigon Pozdnyĭ [Late Perdigon]. It is vigorous, productive and hardy. The fruits ripen in September and are elliptical, dark mauve or blue with a bloom, and weigh 28 grm. The flesh is yellow and has good consistency and flavour. The stone is free.

Renklod Gruševidnyĭ [Pear Gage] is productive, hardy and resistant to pests and diseases. The variety is self sterile. The fruits mature in October. They are oval, raspberry colour; with red dots and a waxy bloom. They weigh 31.5 grm. The flesh is yellow. The flavour is good. The stone is free.

Renklod Zelenyĭ Krasnopaharskiĭ [Krasnyĭ Paharj Green Gage] is productive, hardy and resistant to pests and diseases. The fruit ripens in September. It is round, green with white dots and has a waxy bloom. The fruits weigh 20 grm. and have green flesh which has a good flavour. The stone is free.

Skorospelka Kruglaja [Early Round] is hardy and productive. It reaches maturity in August. The fruits are round and mauve, and weigh 9 grm. The flesh is yellow and has a good flavour.

1318. CAPUCCI, C.

Le selezioni di pesco "C. Capucci". (**C. Capucci's peach selections**).

Riv. Ortoflorofrutticolt. Ital., Firenze 1950 : 34 : 167-75.

Descriptions are given of 18 Italian varieties of freestone peaches obtained by selection during 1942-48 and exhibited at the Verona Show. Most of them were derived from Hale and S. Anna and a few from Buco incavato [Hollow Cavity].

1319. ADRIANCE, G. W.

Profilassi e lotta diretta contro le virosi ed i nematodi del pesco negli Stati Uniti. (**Prophylaxis and direct control measures against viruses and nematodes of the peach in U.S.A.**).

Riv. Ortoflorofrutticolt. Ital., Firenze 1950 : 34 : 119-23.

One possible method of controlling virus disease is the identification and selection of healthy and resistant varieties.

Measures that may be of assistance in combating nematode infestation include: (1) the cultivation in association with peach trees of herbaceous plants resistant to nematodes; and (2) the use of resistant stocks.

The latter method is complicated by the occurrence of the two species *Meloidogyne incognita* and *M. javanica*, as the latter attacks stocks resistant to *H. javanica*.

Stocks tested for resistance have included peaches from China and Russia, and the nectarine Quetta, various types of apricots and other wild peaches. The affinity between stock and scion has also to be taken into account. The only success so far recorded is S. 37, a wild stock from an ornamental peach tree; it is resistant to both species of nematode.

1320. HESSE, C. O.

Philip and Mabel. Two new nectarines for California.

Bull. Calif. Agric. Exp. Sta. 1950 : No. 717 : Pp. 8.

The nectarines Philip and Mabel are sister seedlings of a cross between Humboldt and a seedling of Burbank's Gold. Both are yellow fleshed, free stone varieties with good quality. Philip is recommended for transporting since its flesh is firmer than that of Mabel; the latter variety is best suited to the local market and domestic garden. Both varieties mature a few days before Gower. The trees are vigorous and set heavy crops of fruit.

1321. NAKAMURA, M.

Cytological studies in the genus *Citrus*. III. Further data on chromosome numbers.J. Hort. Ass. Japan 1942 : 13 : 30-40 [from *Heredity* 1950 : 4 : p. 399].

An examination of some 150 different citrus types showed that the chromosome number was uniformly $n = 9$, except in the Sampson tangelo and the variety Shikinari mikan of *Citrus madurensis*, which are tetraploids. Nine haploid chromosomes were also observed in representatives of *Poncirus* and *Fortunella*. A high degree of chromosome homology was found in intrageneric crosses within *Citrus* and in crosses between *Citrus*, *Poncirus* and *Fortunella*.

1322. NESTERENKO, G. A.

(Subtropical plants in new districts).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 3 : 32-34.

The Mičurinite selection work with citrus fruits and *Eucalyptus* in Moldavia, Dagestan, Azerbaïdžan, the Crimea, the Krasnodar territory and the Soviet republics of central Asia is surveyed. Most of the material was introduced from Georgia, but in some of the above districts preference is being shown to indigenous *Eucalyptus* seedlings grown locally from seed raised in their own nurseries.

The improved agricultural methods include the training of young citrus fruits for drought resistance and hardiness and the use of lemons as mentors. Hybridization work with citrus fruits at the Soči Research Station is mentioned, as a result of which some hardy varieties have been obtained. At the Nikita Botanical Garden, 60,000 citrus seedlings are being trained under varied microclimatic and soil conditions.

1323. BALDACCI, E.,

GAROFALO, F.,

GOIDÀNICH, G. and

RUGGIERI, G.

Mal secco, *Deuterophoma tracheiphila* Petri.

Foreign Agric. Circ. U.S. Dep. Agric. 1950 : FCF-6-50 : Pp. 80. (Mimeographed).

English translations from the original Italian versions are given of the following papers: Knowledge and researches relating to wither tip (mal secco) of citrus trees, by E. Baldacci and F. Garofalo; Nature of resistance of citrus species to the parasitism of *Deuterophoma tracheiphila* Petri, G. Goidànich and G. Ruggieri (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst; 1829). Factors which govern or contribute to the development of mal secco of citrus trees, and methods of combating this disease, G. Ruggieri (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2466); Recent observations on the biology of *Deuterophoma tracheiphila* Petri and discussion of the etiology of mal secco of citrus trees, G. Goidànich and G. Ruggieri; and Rapid experimental reproduction of the mal secco of citrus trees, G. Goidànich and G. Ruggieri. In addition to information on the nature of resistance to the disease, the papers provide some data on the reaction of *Citrus* species and varieties to mal secco.

1324. COSTA, A. S.,

GRANT, T. J. and

MOREIRA, S.

Investigações sôbre a tristeza dos *Citrus*. II. Conceitos e dados sôbre a reação das plantas cítricas à tristeza. (**Investigations on the tristeza disease of *Citrus*. II. Ideas and data on the reaction of citrus plants to tristeza**).

Bragantia, São Paulo 1949 : 9 : 59-80.

Tests involving the use of virus-carrying citrus aphids showed: (1) that sweet oranges were highly susceptible to tristeza; (2) that mandarins, though showing some resistance to

infection, developed severe symptoms eventually; (3) that tolerant tangelos were very susceptible; (4) that non-tolerant tangelos, susceptible citranges and grapefruits showed medium susceptibility and moderately severe symptoms; (5) that pomelos, shaddocks and sour oranges were resistant to infection and, when infected, showed only moderate symptoms; and (6) that *Poncirus trifoliata*, citrumelos and resistant citranges could not be infected.

Some seedlings of *P. trifoliata* x sweet orange permitted virus increase; others did not. Reaction to virus by the seedlings was not correlated with trifoliate leaf shape. Back crosses of the above seedlings to the sweet orange tended to resemble the latter in reaction to tristeza.

Hybrids between *P. trifoliata* and grapefruits usually resembled the former in reaction to tristeza, suggesting the operation of dominant factors for resistance.

No clear cut type of inheritance of reaction to tristeza could be detected in the cross *Citrus reticulata* x *C. paradisi*.

1325. BURKE, J. H.

A study of the citrus industry of Spain 1950.

Foreign Agric. Rep. U.S. Dep. Agric. 1950 : No. 56 : Pp. 122. (Mimeo-graphed).

A summary of the historical development and present economic position of the citrus industry provides information on the varieties of sweet and bitter orange, tangerine, grapefruit and lemon. Tabulated details of varietal differences are presented; these include (1) a comparison of the monthly weight changes; (2) a comparison of the seasonal variations in the chemical composition of sweet oranges; (3) the characteristics of fruit and juice of tangerines and oranges; and (4) the distribution of carotenoid pigments in all the cultivated citrus fruits. Data are given of the reactions of different varieties of orange to processing and canning methods.

1326. CONDIT, I. J.

An interspecific hybrid in *Ficus*.

J. Hered. 1950 : 41 : 165-68.

Hybrids from the cross *F. pumila* x *F. Carica* have been produced at the Citrus Experiment Station, Riverside, California. The leaves of the hybrids are intermediate between those of the two parents; the synconia are non-parthenocarpic and resemble those of the female parent *F. pumila*. Root tip preparations of the hybrid seedlings showed complements of chromosomes similar to those found in *F. Carica*, without any marked differences in their morphology.

1327. TABAIN, F.

Prilog proučavanju morfoloških i bioloških osobina naših smokava. (A contribution to the study of the morphological and biological properties of our figs).

Radovi Poljoprivred. Naučno-Istraživačk. Ustanova, Beograd 1949 : 1 : 124-56.

The principal varieties of fig cultivated in Jugoslavia are described.

1328. MUKHERJEE, S.

Wild mangoes of India.

Sci. and Cult. 1950 : 15 : 469-71.

Descriptions are given of the closely allied wild species *Mangifera sylvatica* and *M. indica*, which include forms of potential breeding value. The two species may well hybridize in nature. Three types of the former species are described, all from northeastern India. The latter species includes two types, the Chittagong Hill Tract type, and the Kalahandi type from the Thummul Rampur forests; eight subtypes based on fruit characteristics are distinguished within the Kalahandi type.

1329. NAIK, K. C.

Improvement of the mango, *Mangifera indica* L. by selection and hybridization.

Indian J. Agric. Sci. 1948 : 18 : 35-41.

Descriptions are given of three F_1 hybrids of mango, 7/5 and 9/3 (Neelum x Himayuddin) and 11/13 (Suvarnarekha x Jehangir), and of six natural seedlings, which have been obtained in improvement work at Kodur Fruit Research Station, Madras. In view of their good fruit quality and tendency to bear well, the hybrid seedlings 7/5 and 11/13, and the natural seedlings KO 11 of unknown parentage and KO 22 from the variety Dilpasand have been selected for clonal propagation. Indian mangoes are predominantly monoembryonic; it has been found that in crosses between polyembryonic and monoembryonic varieties the progeny is polyembryonic, regardless of the direction of the cross.

1330. MUKHERJEE, S. K.

Cytological investigation of the mango (*Mangifera indica* L.) and the allied Indian species.

Proc. Nat. Inst. Sci. India 1950 : 16 : 287-303.

Cytological investigations of *Mangifera sylvatica*, *M. caloneura* and *M. indica* are described. All three species were found to possess chromosome numbers of $n = 20$ and $2n = 40$, as reported elsewhere by the author (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2589). The genus has been divided into two sections, according to the presence or absence of the disc (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1879); study of pollen morphology and size in several species and the data on geographical distribution and on chromosome numbers in the literature suggest that the chromosome number of $2n = 40$ occurs in the majority of the species belonging to section I, comprising species with a well-developed disc and only one of the five stamens fertile. The karyotypes of *M. sylvatica* and *M. indica* were subjected to detailed analysis. On the basis of morphological characteristics 11 types of chromosomes have been distinguished, 3 of which are intergrading and 8 distinct. Interspecific and intervarietal differences in cytology consist mainly of different intergrading proportions of the 11 chromosome types. The total number of satellited and secondarily constricted chromosomes varied between 9 and 16 per complement; the number of unconstricted short chromosomes ranged from 6 to 20. Phenotypic and karyotypic characteristics showed parallelism in their intergrading nature. A comparison of the karyotypes of *M. indica* revealed close similarities between pairs of varieties both within *M. indica* and inter-specifically between *M. indica* and *M. sylvatica*. Evidence is given in support of the view that the basic chromosome number of *Mangifera* is $x = 8$, a number possibly derived from $x = 5$; and that the three species studied have an allopolyploid origin (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2589).

1331. GUTIEV, G. T.

(The subtropical persimmon).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 1 : 39-42.

The Japanese persimmon, *Diospyros Kaki*, is the most important plant after tea, citrus fruits and tung cultivated in the Soviet subtropics. Most of its cultivated varieties are diclinous, although Zendži-Maru, Ganter [Hunter], Opylitel' [Pollinator] and some other varieties produce both male and female flowers upon the same trees.

Korolek [Little King], which has the synonyms Hiakume and Kiombo, is the best variety of the variable group of persimmons. Its fruits weigh between 250 gm. and 300 gm., are round and have black concentric markings on their skin. The flesh is brown in fruits containing seed and orange in seedless fruits.

The Georgian standard Hačia is regarded as one of the best constant varieties. It has large elongated conical fruits weighing 200 gm. They have a good flavour. The variety is most productive in districts with arid climates.

The variety Činebuli, which has the synonyms Džiro and Prevoshodnyi [Excellent], is the best of the tannin-free group of Japanese persimmons, while Tamopan is noted for its hardiness.

The main aspects in selection work with persimmons is breeding and training for resistance to cold and drought. Some promise is shown in this respect by the hybrids between *D. Kaki* and *D. virginiana* and the seedlings of Tamopan, Korolek and Hačia. *D. virginiana* varieties are also grown for their fruits, which are intermediate in quality between the fruits of *D. Kaki* and the small fruited indigenous *D. Lotus* forms, and are used as rootstocks for *D. Kaki*.

1332. ZARECKIĬ, A. JA.

(**Growing the persimmon in central Asia**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 1 : 42-43.

Acclimatization trials of the Japanese persimmon in Soviet central Asia have established that it is sufficiently hardy for unscreened cultivation in some parts of the Tadžik, Uzbek and Turkmenian SSR. Reference is made to breeding for hardness at the South Uzbek Research Station for Subtropical Crops, as a result of which some useful plant material has been obtained.

1333. ZARUBIN, A. F.

(**The question of the second bloom of walnut**).

Priroda (Nature) 1949 : No. 10 : 65-67.

Observations made in Kirgizia on wild walnuts showed that the phenomenon of second bloom is relatively rare and that it is encountered mostly after frost damage to flowers of individuals growing in open spaces rather than in the forest. The yield of walnuts developed as a result of the second flowering is too low to have economic importance, but it is suggested that the nuts so obtained have their uses in Mičurinite breeding for short growth period. An inflorescence bearing staminate and pistillate flowers and perfect flowers was found upon a plant flowering for the second time after its first blooms had been damaged by frost. The development of the perfect flower is attributed to atavism.

1334. KALMYKOV, S. S.

(**How to increase the yield in walnuts**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 1 : 26-29.

A study of the flowering biology of wild walnuts in the Bostandyk district, Kazah SSR, is reported. It was found that in a sample of 44 trees the flowering of the staminate and pistillate flowers began and ended simultaneously only in 6 trees. In 26 trees the flowering of the male and female flowers partly overlapped and in 12 trees the two types never flowered simultaneously at all. An improvement of the productiveness of the trees is being attempted by grafting into the crowns of the female walnuts scions of suitable male pollinators.

1335. ZARUBIN, A. F.

(**Possibility of parthenogenesis in walnut and black walnut**).

Priroda (Nature) 1949 : No. 10 : 64-65.

Preliminary results of a study with walnuts conducted in Kirgizia in 1948 suggest that protogynous individuals are self fertile and have a capacity for parthenogenetic development of their fruits. Protandrous individuals were found to be self sterile and to lack the capacity for the development of parthenogenetic fruits. The findings are supported by evidence obtained during the author's study of floral biology in *Juglans nigra*.

1336. REBOUR, H.

Le pacanier en Afrique du Nord. (**The pecan in North Africa**).

Rev. Hort., Paris 1949 : 121 : p. 159.

The development of pecan growing in Algeria is described, with notes on the value and yields of some commercial varieties and some selected seedlings.

1337. LEROY, J. -F.
 Note sur les noyers (*Carya* et *Annamocarya*) sauvages d'Indochine. [**On the wild walnut trees (*Carya* and *Annamocarya*) of Indochina**].
 Rev. Bot. Appl. 1950 : 30 : 425-28.

In discussing the taxonomic status of the wild walnuts of Indochina, the writer maintains that: (1) there are 3 good species of *Carya* in Eastern Asia viz. *C. cathayensis*, *C. tonkinensis* and *C. (Juglans) Polanei*; (2) there are probably no walnuts of the genus *Juglans* growing wild in Indochina; and (3) that *Carya* is probably of Asiatic origin.

1338. Orienterende sortsforsøg med hassel. (**Preliminary variety trials with hazels**).
 Tidsskr. Planteavl 1950 : 53 : 728-32.

The performance of 26 varieties of hazel bushes at Hornum and Spangsbjerg, Denmark, has been recorded. Lambert Filbert gave the highest yield, 76.9 kg. per ha., and Lang Zeller came next with 54.1 kg. Gunslebener had the largest nuts, 100 weighing 355 gm. and Bollwiller the smallest, 100 nuts weighing only 155 gm. Marked varietal differences were also noted in the proportion by weight, ranging from 60 to 37%, of shell to kernel. Eleven varieties are described.

1339. NIXON, R. W.
Imported varieties of dates in the United States.
 Circ. US Dep. Agric. 1950 : No. 834 : Pp. 144.

Attention is drawn to the confusion in the nomenclature of date varieties imported into the United States. The literature on date varieties in the Old World is surveyed; and an account is given of early plantings of date seeds in the United States, variability in seedling dates, experimental and commercial importations of offshoots, and location of date growing districts and specimen palms in the United States. Characters used in describing date varieties are discussed; and detailed descriptions of commercial varieties and an identification key based upon fruit and vegetative characters are presented. Notes on many non-commercial varieties are also included. A useful bibliography comprises 69 references.

1340. KOVALEVA, T. N.
(The cultivation of *Cornus Mas* in the USSR).
 Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 1 : 31-33.

The growth habit, fruit properties and external requirements of *C. Mas*, which grows wild and is being cultivated in the south of the USSR, are described. The account contains notes on the methods of its reproduction and a general description of the size, shape and colour of the fruits of the cultivated forms. Selection work has so far been neglected and it is proposed to start the work with the trials of local varieties and introductions of plant breeding material from other districts. The differences in the shape of the fruits are illustrated by drawings of the drupes and stones of the varieties Španskii, Gruševidnyi [Pear Shaped], Černyi 6 [Black 6] and Černyi 38.

1341. GONZALEZ, L. G. and
 BUNOAN, J. C. (JUN.).
Variability of pili trees grown in the College of Agriculture.
 Philipp. Agric. 1947 : 31 : 60-65.

Data are given on the variability of tree and fruit characters of the pili (*Canarium ovatum*) grown at the College of Agriculture, Laguna, Philippines. Two seedling trees, 66 and 74, were selected on the basis of total number of fruits produced, and fruit quality as indicated by mean weights of the fruit, nut, pulp and edible kernel. The trees studied were diecious, 54.73 and 45.27% of the population being female and male, respectively.

1342. EVREINOFF, V. -A.
Notes sur les variétés d'*Actinidia*. (Notes on the varieties of *Actinidia*).
Rev. Hort., Paris 1949 : 121 : 155-58.

Eleven varieties of *Actinidia*, which is remarkable for cold resistance and high vitamin C content, are described, and reference is made to Mičurin's selections made about 1914.

1343. ALEKSANDROV, A. D.
(**Papaya**).
Priroda (Nature) 1949 : No. 10 : 68-69.

Vegetative and sexual reproduction of *Carica Papaya* at Soči is reported. The initial plant material was introduced to the USSR from Australia in 1947. *C. Papaya* is regarded as a harder plant than tomato and acclimatization work is expected to present little difficulty. The seed from plants grown in Russia is regarded to be of special value to the Soviet breeder.

1344.
Se ha descubierto un nuevo aguacate en la Rep. Dominicana. (**A new avocado has been discovered in the Dominican Republic**).
Agricultura, San Cristóbal 1949 : 40 : No. 186 : p. 30.

A new avocado, yellow in colour, and of high quality, has been discovered in the Cibao valley.

1345. KOZLOV, K.
(**Introducing *Rubus arcticus* to horticulture**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 1 : p. 72.

Selection work with the wild forms of *R. arcticus* for the purpose of creating horticultural varieties is urged.

1346. TER PELKWIJK, A. J.
Een studie over bramenrassen. (**A study of blackberry varieties**).
Meded. Direct. Tuinbouw 1950 : 13 : 774-88.

Himalaya is the only variety worth cultivating in Holland, but is insufficiently winter hardy, although healthy and a good yielder. Holland must breed its own varieties, paying attention to cytology, using indigenous material. Systematics, reproduction and cytology are discussed. Cultivated brambles are more exposed to cold, drying winds, than wild specimens which are protected by other plants. Frost hardy wild plants should be tested under cultivation before being used for breeding. Notes on a number of varieties selected from wild brambles and crosses are given, as well as of thornless brambles and hybrid berries.

1347. SIMMONS, W. A.
Secretary's corner.
N.S. Dak. Hort. 1950 : 23 : 141, 144.

A note by A. F. Yeager on an introduction from Korea, believed to be *Rubus morifolius*, is quoted. The species has produced more berries in its third growing season than any cultivated raspberry variety.

1348.
Raspberries and blackberries.
Circ. Canad. Dep. Agric. 1950 : No. 183 : (Publ. 836) : Pp. 11.

Descriptions of red, purple and black raspberry varieties recommended for different parts of Canada are included. The blackberries Lowden and Eldorado are named as suitable for cultivation under certain conditions.

1349. BROWN, J. F.
Raspberry and blackberry culture.
 Bull. Ont. Agric. Coll. 1950 : No. 473 : Pp. 41.

Descriptions of red, black and purple raspberry and blackberry varieties recommended for commercial or limited trial planting in Ontario are given.

1350. HAMILTON, A.
The blackberry mite (*Aceria essigi*).
 N.Z. J. Sci. Tech. 1949 : 31 : 42-45.

Wild blackberries and the cultivated varieties Himalaya and Evergreen are susceptible to *A. essigi* in the USA and several districts of England. Susceptible wild blackberries are also found in New Zealand, but the commonly grown Evergreen variety appears to be resistant.

1351. SIMONOVA, M. N.
(New gooseberry varieties).
 Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 6 : 28-31.

Eight productive and *Sphaerotheca* resistant gooseberry varieties, obtained by distant hybridization at the Moscow Fruit Research Station, are described. Five of the new varieties are under trial and the other three are recommended for state trials.

Rekord 10-46 [Record 10-46] is a late variety, from Haughton x Finik [Date]. It has oval, glabrous, brownish red fruits with a waxy bloom. They weigh 6-8 gm. and are eight times as large as the fruits of Haughton. The brownish green flesh has a good flavour.

Smena 7-24 [Change 7-24] is a productive mid season variety which was obtained from Haughton x Zelenyi Butylochnyi [Green Bottle]. It bears oval, red, glabrous fruits with a waxy bloom. Flesh is red and has a good flavour. The fruits are three times as large as those of Haughton.

Jahontovyi 4-24 [Gem 4-24], from Haughton x Avenarius, is a late variety. It has oval, red glabrous fruits with a bloom. The fruits are four to five times as large as those of Haughton and have a good flavour.

Izumrud 3-86 [Emerald 3-86], from Haughton x Zelenyi Butylochnyi [Green Bottle], is a mid season variety. It has oval, dull green fruits with a waxy bloom and green flesh, which has a good flavour.

Jantarnyi 1-82 [Amber 1-82], from Limonnyi Ispolinskiï [Lemon Giant] x Haughton, is an early variety. It has oval fruits which have a good flavour and are five to six times as large as those of Haughton. The skin is hairy, yellowish green and with brownish red patches on the side turned to the sun.

Geroi 2 [Hero 2], from Haughton x Finik [Date] is a mid season variety. Its fruits are round, cherry red with a bloom, glabrous and four to five times the size of the fruits of Haughton.

Krasnaja Zarja 3 [Red Dawn 3], from Haughton x Varšavskii [Warsaw], is a mid season variety. It has oval, bright red glabrous fruits which have a bloom, and are three to four times the size of those of Haughton. The skin is thin and translucent. The flavour is good.

Variety 4-18, from Haughton x Avenarius, is a late variety with fruits four to five times larger than those of Haughton. The fruits are round, green with brown patches, with bloom, and are glabrous. The flesh is green and has a good flavour.

Further breeding work is in progress at the institute, the aim being varieties showing resistance to *Sphaerotheca*. The methods employed include multiple hybridization between the new varieties and the best existing varieties and crosses with the wild American species of gooseberries which are resistant to *Sphaerotheca*, especially with *Grossularia divaricata*. A high percentage of hybrids from the crosses involving *G. divaricata* was immune to *Sphaerotheca*, but the material also inherited its small size, dark colour and unsatisfactory flavour of the fruits. It is hoped that the undesirable characters will be eliminated as a result of back crossing and directed training of the hybrids.

1352. BAILEY, J. S.,
FRANKLIN, H. J. and
KELLEY, J. L.

Blueberry culture in Massachusetts.

Bull. Mass. Agric. Exp. Sta. 1950 : No. 358 : Pp. 24.

Information on 12 blueberry varieties is included. Concord, Pioneer, Rubel and Jersey are recommended for commercial cultivation in Massachusetts.

1353. FLORY, W. S. (JUN.).

Pollen condition in some species and hybrids of *Rosa* with a consideration of associated phylogenetic factors.

Virginia J. Sci. 1950 : 1 : 11-59.

Data obtained by previous workers on pollen abortion in *Rosa* species are summarized. In the present study 95 species and approximately 55 botanical, horticultural and cytological variants of *Rosa* were analysed for percentage of normal pollen during a five year period. Only slight seasonal variation in pollen condition was encountered in most species and hybrids. A marked variation was often, but not always, observed in the pollen condition of (1) variants of the same species showing differences in chromosome number and (2) species and certain of their botanical varieties exhibiting no chromosome differences. Average percentage of normal pollen decreased with increase in chromosome number in the diploid, tetraploid, hexaploid and pentaploid groups. The single octoploid species was high in percentage of normal pollen; the triploid forms were very low. Broad differences in percentage of normal pollen according to the geographical origin of species were noted. Data on the production of normal pollen in interspecific hybrids arranged in groups based upon chromosome number conformed fairly well with observations made upon species and varieties. In several cases hybrids resulting from crosses between species believed to be quite diverse genetically and remote taxonomically produced unexpectedly high percentages of normal pollen. Hurst's differential septet theory of the evolution of *Rosa* species is discussed, in which most of the present day species are regarded as having descended, by loss of chromosome septets, from a now extinct hypothetical decaploid species. The author argues in favour of the view that the polyploids have originated from forms with lower chromosome numbers, i.e. by ascent rather than descent. The centre of origin of *Rosa* is postulated as eastern Asia; and the possible distribution and evolution of the genus are outlined. Finally, the past and present role of hybridity in speciation of *Rosa* is considered.

1354. ROEVER, W. E.

New early strawberry—Tennessean can make 382 crates per acre.

Sth. Seedsman 1950 : 13 : No. 11 : p. 50.

Developed from a cross between two selections at the Tennessee Agricultural Experiment Station, the new strawberry Tennessean is characterized by good yielding ability, frost resistance, earliness, a high degree of disease resistance, and bright glossy fruits somewhat darker in colour than those of Blakemore.

1355. POZDEEV, V. A.

(A remarkable variety of strawberry).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 4 : p. 90.

A strawberry variety which comes into bearing in June and continues to bear fruits until late autumn is described. It yields 2 kg. fruit per square meter per season. The strawberry grows in the garden at Rakver, Estonia.

The strawberry is intermediate between the wild strawberry and cultivated strawberry in size, shape, colour, and flavour of the fruit. The variety cannot be propagated in the normal way with runners, but is reproduced either sexually or by the division of the mother plants. Several large fruited plants cropping continuously from June to September have been selected.

1356. ŠAKSELJ, E. G.

(New everbearing varieties of strawberry).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 7 : p. 76.

Two everbearing varieties of strawberry, Ada and Neisčerpaemaja [Inexhaustible], which are more productive than Osennjaja Radostj [Autumn Joy] are described. The varieties were studied at the Central Botanical Garden of the USSR Academy of Sciences in Moscow. Neisčerpaemaja comes into bearing in early June and continues cropping until December. It is a productive variety but susceptible to mildew. The fruits weigh 12 grm., and are round and red and have pale pink flesh of good flavour.

Ada begins bearing simultaneously with Mysovka [Bay] and continues bearing fruits in the open until the first autumn frosts. Upon transfer indoors, the fruiting season is prolonged until December. The variety is productive and resistant to mildew and pests. The fruits weigh 10 grm. and are bright red and glossy, oblong-conical, and with a light soft flesh. The flavour is good.

The two varieties are expected to give useful material for crosses with the standards.

1357. KLINKENBERG, C. H.

Wortel- en stengelziekten van aardbeien. (Root and stem diseases of strawberries).

Meded. Direct. Tuinbouw 1950 : 13 : 756-65.

Madame Lefebvre is less susceptible to black root rot than other varieties grown in Kennemerland. Jucunda and Madame Moutot are very susceptible to *Verticillium*. Deutsch Evern is generally less seriously attacked, but is very susceptible to *Botrytis cinerea*, by which Jucunda and Madame Moutot are less damaged. There are indications that varieties with hard, dark green leaves, e.g. Frau Mieke Schindler, are but slightly susceptible to *Botrytis*.

1358. CHEESMAN, E. E.

Classification of the bananas. III. Critical notes on species. r. *Musa borneensis* Beccari.

Kew Bull. 1950 : No. 2 : 151-52.

The species *M. borneensis* is described and assigned to the section *Callimusa* on the basis of the characteristic seed shape and chromosome number ($n = 10$). *M. borneensis* crosses with other species of *Callimusa* and with *M. textilis*.

1359. CHEESMAN, E. E.

Classification of the bananas. III. Critical notes on species. s. *M. violascens* Ridley and *M. gracilis* Holttum, sp. nov.

Kew Bull. 1950 : No. 2 : 152-56.

Descriptions of *M. violascens* and *M. gracilis* are presented. The former species is very common in Malaya; it has the chromosome number $n = 10$ and characteristic seed shape of the section *Callimusa*. *M. gracilis*, also occurring in Malaya, is distinct from *M. violascens* in its much smaller size, deciduous bracts, and longer, proportionately more slender fruits, which are never more than 4 to a hand.

1360. ŽGENTI, N. M.

(Scientific research work at the Transcaucasian Branch of the "Magarač" Institute).

Vinodelie Vinogradarstvo SSSR (Wine-making Viticult USSR) 1950 : No. 9 : 60-61.

The results of research on vines and wine making during the last seven years are surveyed. The local varieties Činuri, Goruli Mcvane, Rkaciteli, Cicka [Teat], Kapistoni Tetri, Kvišhuri, Dzvelšavis, Bajan Širei and Matrasa were selected for making champagne. The final

product made from these grapes has the same quality as the champagnes Pinot Černyi [Black Pinot], Pinot Belyi [White Pinot] and Chardonné. Several local varieties, which show promise in making white and red wines, are listed. New varieties and varieties having limited distribution are being studied. Much work has been done in the selection and directed training of wine yeasts, of which a local race Činuri is mentioned. This yeast is very active and makes a pleasant clear wine.

1361. NAUMENKO, N. P. and KUTALEVA, T. S.
(**An accelerated method for the selection of new varieties of vines**).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult USSR) 1950 :
No. 10 : 36-39.

A method developed at the Ukrainian Scientific Research Institute of Viticulture and Wine Making enables the breeder to assess the heritable properties of hybrid vines in the third year. This period is sufficient to permit of a technological evaluation of the varieties for making wine. The method consists essentially in grafting the hybrids at the cotyledon stage upon vigorous green shoots of mature vines, making the grafts in the second, third or fourth nodes. The hybrids thus obtained include an open cross-pollinated Traminer upon an unspecified mentor and Plavaï x Amurskii [Amur] upon an Amur stock.

1362. DESFLASSIEUX, A.
Quarante années d'expérience sur les raisins de table. (**Forty years of experience with dessert grapes**).
Rev. Hort., Paris 1948 : 120 : 99-104.

The French vine breeder should, in the author's opinion, turn his attention to the improvement of dessert grapes.

1363. DALMASSO, G.
Nuovi vitigni Russi. (**New Russian vines**).
Ital. Agric. 1950 : 87 : 543-44.

The Russian breeder's aim is to produce early ripening vines showing late germination, cold resistance, high sugar and low acid content, good growth and regular fruiting. Nine of Mičurin's vines are described from Bulgarian sources, with notes on their resistance to cold and other characteristics. The writer points out that, where the parentage of the vines is given, it shows they are direct producer hybrids with a foxy flavour and are therefore of no interest for typical vine growing countries.

1364. LATTIN, G. DE.
Über die Letalität eines Anthocyan-Gens bei der Rebe. (**On the lethality of an anthocyanin gene in the vine**).
Naturwissenschaften 1950 : 37 : 428-29.

A dominant monomerically inherited allelomorph *R*, characteristic of the varieties of *Vitis vinifera* ordinarily used for red wines, conditions intense anthocyanin formation in the autumn leaves and grape skins. White wine producing varieties are always homozygous for the recessive allelomorph *R*⁺ which inhibits formation of anthocyanin in leaf and skin. In rare cases, anthocyanin production in this species may, apart from the *R* allelomorph, be conditioned by other genes which, however, are probably only allelomorphs of the *R* locus.

In the *F*₂ progenies from selfing heterozygous *RR*⁺ vines there are always more anthocyanin-free plants than would be expected on the basis of monohybrid inheritance, the segregation ratio found being 2 : 1, instead of 3 : 1. This result shows that the dominant *R* allelomorph is a factor with a homozygous lethal effect, especially notable in this case in which a markedly lethal gene has become a highly characteristic component of the genome of many varieties of the cultivated plant.

Making use of another allelomorph of the *R* series, R^{rec} , it was possible to compare R^{rec} R^+ clones with R^+R^+ clones, derived by somatic mutation from the former, and so to study the effect of the R^{rec} allelomorph independently of any accessory effect of the rest of the genome. It was found that the allelomorph conditioning colour affects not only the formation of anthocyanin but also the sugar metabolism of the *Vinifera* vines, R^{rec} R vines showing a slight, but definite, increase in sugar in the grape juice as compared with R^+R^+ vines. Hence it seems that the anthocyanin controlling allelomorph of the *R* series produces its homozygous lethal effect through interference with the sugar metabolism of the vine.

1365. KOBEL, F.

Müller-Thurgau als Forscher und Direktor. (**Müller-Thurgau as research worker and director**).

Schweiz. Z. Obst- u. Weinb. 1950 : 417-20.

LÜTHI, H.

Die Forschungen Müller-Thurgaus auf dem Gebiete der Getränkebiologie. (**Müller-Thurgau's investigations in the field of biology in relation to beverages**).

Ibid. 1950 : 420-25.

Both papers record the centenary celebrations in honour of Müller-Thurgau, formerly director of the Wädenswil Research Institute for Viticulture and Horticulture. His scientific approach to practical problems is exemplified by reference to his successful hybridization of vines and to his production of pure strains of yeasts for wine making. His most famous hybrid, Riesling x Sylvaner, receives special mention.

1366. MAKAROV-KOŽUHOV, L. N.

(**An accelerated method for negative mass selection**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 3 : 24-26.

The current instructions on the selection of vines in the Krasnodar territory have been modified at the Anapa Research Station of Viticulture and Wine Making. The new method permits of a more rapid elimination of unproductive vines. The need for continued selection is pointed out because of the changing external conditions, which in the Mičurinite view may periodically cause changes for better or worse in the individual plants.

1367. MARRIOTT, P. F.

Pollination of table grapes.

J. Dep. Agric. Vict. 1950 : 48 : 391-94.

The variety Ohanez is self sterile but the pollen of Gordo Blanco, Sultana, Waltham Cross and Purple Cornichon is compatible with it and will result in a satisfactory fruit set.

1368. TUPIKOV, M. A.

(**The tasks of viticulture in the Herson province**).

Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1950 : No. 9 : 43-45.

The aims of selection work are the development of hardy vines whose buds burst late and grapes reach maturity early, and the selection and training of self-pollinating forms within the group of self sterile varieties having bisexual flowers. The training method referred to consists of giving the vines careful attention and not pruning them too closely. It is pointed out that inadequate horticultural methods and hard pruning have the effect of causing the development of sterile pollen by Muscat Gamburskii [Hamburg Muscat] and Muscat Aleksandriiskii [Alexandria Muscat], while on the other hand such varieties as Čauš, Tavkveri and Nimrang, which normally produce sterile pollen, develop, as a result of better care and less radical pruning, flowers bearing fertile pollen.

1369. MAKOVECKIĬ, N. I.

(**On improvement of the variety Pinot Černyi***).

Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1950 :
No. 9 : 40-43.

As a result of clonal selection in the Crimea of the vine variety Pinot Černyi productive clones with uniformly compact bunches were obtained, including the early clones 2, 16 and 1. Clone 2 reached maturity simultaneously with the very early variety Žemčug Saba [Perle de Csaba] on 21 July. Clone 5 had the longest growth period, reaching maturity on 16 August.

1370. POPLAVSKIĬ, F. S.

(**Kalačeevskii grapes**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 7 : 38-39.

Mention is made of several new hybrid vines, which were bred from the early local variety Petri in the Kalačeevskii district, Voronež province. The size of the grapes of the hardy local vine was improved by hybridization with early varieties whose pollen was obtained from Jalta. The pollinating varieties included Agostenga and Madeleine Royale.

Three of the new hybrids are briefly described. Variety 2-b reaches maturity in July when it produces large white, sweet grapes in bunches weighing 200 grm. Variety 12-p matures at the same time. It bears medium large bunches of sweet, yellowish white grapes. Variety 7-k reaches maturity in August. It bears bunches weighing between 200 and 250 grm. The grapes are greenish white, large and very sweet.

1371. OHREMENKO, N. S.

(**Scientific research work in industry**).

Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1950 :
No. 9 : 53-56.

A warning is given against the neglect in the Soviet wine making industry of some less widely cultivated local varieties of vines. Some of these such as Ekim Kara, Sary Pandas and Kefesija in the Crimea and Kuljdžinka in central Asia are ancient varieties and make excellent wines. They are again being introduced into industry, some of them as standards for several districts.

1372. RUČKA, A. S.

(**In the vineyards of the Cauljskii State Fruit Nursery**).

Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1950 :
No. 9 : 59-60.

Notes are given on some of the 20 European vine varieties which are productive and sufficiently early and hardy under Moldavian conditions. Aligoté showed the highest degree of resistance to mildew. Of the early varieties Žemčug Saba [Perle de Csaba] does well, and of the medium early varieties Linjjan and several others.

1373. BREIDER, H.

Morphologische Resistenzmerkmale der Rebenblätter. (**Morphological resistance characters of vine leaves**).

Züchter 1950 : 20 : 210-12.

The more compact structure and coarser texture of the leaves of Vinifera vines from April to June in Germany constitute unfavourable conditions for phylloxera, but as the vegetation increases the leaves become less coarse and then they are attacked by phylloxera. The resistance of Vinifera to the fundatrix in May has nothing to do with the fact that cultivated vines do not provide suitable nutriment for the fundatrix; the cause lies rather

in the environmental conditions being equally unfavourable to vine and parasite and so the vines are field resistant.

Phylloxera is highly dependent on environment, as is also the vine. Therefore, having analysed the resistant characters, the breeders' task should be to breed vines which at least as regards the expression of the characters required are as stable as possible in regard to environment. Marked pubescence seems to cause resistance and the compacter structure and coarser texture of the leaves of *Vinifera* vines grown in the open, as compared with the corresponding qualities of leaf in American vines, seem also to be characters producing resistance. Scheu has proved that pubescence and coarse texture of leaf were characters for resistance to *Plasmopara viticola*.

The work of Schilder and Müller is adversely criticized.

FORESTRY

1374. BUCHOLZ, E.

Neue Strömungen in der sowjetischen Waldwirtschaft. (**New currents in Soviet forestry**).

Z. Weltforstw. 1949-50 : 13 : No. 7-9 : 1-3.

The impact of Mičurinite genetics upon forestry principles is acknowledged. The controversial issues raised by Lysenko are given without comment in a German translation of his article on the sowing of protective forest belts in clusters.

1375.

Report on forest research for the year ending March 1949.

Forestry Commission, London 1950 : Pp. 80.

Peace, T. R.

Pathology. (pp. 12-18).

Poplar variety trials are in progress at different centres. At the Forest Research Station, near Farnham, Surrey, poplar varieties are under test for canker resistance; among the clones recently received and collected are supposedly resistant strains of *Populus Eugenii* and normally susceptible varieties of *P. trichocarpa*.

Samples of native *Castanea* have been sent to Italy and America for testing for resistance to *Endothia parasitica*.

Inoculation tests of *Ulmus* clones for resistance to elm disease were resumed; resistant clones are being propagated by grafting. The Dutch selection, *Bea Schwarz*, said to be resistant to *Ceratostomella* and *Nectria*, has been imported for trial.

Matthews, J. D.

Genetics. (pp. 26-29).

Variation in leaf size and shape has been investigated in beech. In a district in Hampshire an interesting variation was observed. At one extreme were trees with narrow leaves, short and sharply ascending branches and very straight persistent leaders; these individuals were making very fast growth and were well above the frost zone. At the other extreme were trees with somewhat wider leaves, longer and spreading branches, no persistent leaders and poor coarse form; the latter individuals appeared to have been regularly frosted. In larch, branch form has proved of value in the identification of certain provenances.

Variation in stem form and crown of Scots pine has been studied in Norfolk and Kent.

Sitka spruce trees resistant to frost and possibly also to the insect *Neomyzaphis abietina* have been located in North Wales.

The differentiation of *Pinus contorta* into coastal and mountain forms was studied at two places in North Wales.

Assessment of form in provenance trials was undertaken by two methods, one visual and the other consisting largely of measurements. It is probable that the visual method will be of value in bringing out major distinctions between large numbers of provenances, whereas measurements will be required to bring out fine distinctions and a clear picture of variations within a provenance.

Grafting is being used to (1) facilitate the establishment of breeding material, (2) to provide

material for comparative trials to test the genetical quality of individual élite trees and for the formation of seed orchards, and (3) to encourage early flowering and to enable artificial pollination to be carried out near ground level. The veneer, side and whip-and-tongue grafts have been found to be the most useful.

Genetical observations are being made on a number of species at the centres, with particular reference to the dates and period of flowering and the degree of protandry and protogyny.

Pinus Banksiana and *P. contorta* were chosen for experimentally controlled pollination work at the Forest Research Station, Surrey. A long term scheme of controlled pollination in the Bedgebury Forest Plots, Kent, has been planned in order that advantage may be taken of the great number of species at this locality.

Wood, R. F. *Provenance studies.* (pp. 50-56).

Provenance trials of European larch, Japanese larch, Norway spruce, Sitka spruce, Scots pine and *Pinus contorta* are reported.

Wood, R. F. *Arboreta and forest gardens.* (pp. 56-57).

An account is given of the collections of forest species maintained at different centres under the management of the research branch, which serve chiefly for trials of performance under definite conditions.

Laing, E. V. *Botanical studies on tree races.* (p. 78).

The main species studied at Aberdeen University during the year under review were larch, Scots pine and Douglas fir. The data indicate that races of larch can be differentiated with a good deal of accuracy from the form of the cone scale and shape of the seed wing. From the material examined, it was possible to divide Scots pine into four morphological groups depending on needle width and thickness. Characters of value in subdivision of these main groups comprise length of needle, waviness of outline of needle, amount of collenchyma in the leaf and colour of the current year's shoot. Cones are not yet available from all the trees in the race plots. Preliminary data suggest that shape of seed and length and breadth of wing may be more distinctive racial characteristics than the external features of the cone. It has been found that types of Douglas fir can be more readily defined than those of other species. Cone differences have been noted; leaf arrangement, leaf texture, and hairiness or absence of hairs on the twig are proving to be very distinctive. Correlation between morphological characters and sylvicultural value in Douglas fir is to be attempted.

1376. DAY, W. R.
Forest hygiene. I. The conception of health and the character of the forest in relation to health.
 Emp. For. Rev. 1950 : 29 : 204-10.

Genetical variability within species is discussed in connexion with the environmental requirements of the various strains of forest trees.

1377. PAVARI, A.
 Genetica forestale. (**Genetics of forestry**).
 Atti Congr. Agrar. Naz., Torino 1948 : Pp. 24.

The history, development and methods of forest tree breeding and genetics is reviewed with examples of the advances made in Italy and various other countries of Europe and in America and the USSR.

1378. TAKIZAWA, S.
 (**The chromosomes of the genus *Acer***).
 Jap. J. Genet. 1940 : 16 : 18-22.

Eight species of *Acer* were shown to have $2n = 36$ chromosomes. Meiosis was generally regular but with secondary pairing, suggesting that the basic number of the genus is $x = 5$. Meiotic aberrations were observed in one plant of *A. japonicum*.

1379. CLAPPER, R. B.
Breeding new chestnuts for Southern forests.
 For. Farmer 1950 : 9 : No. 11 : p. 8.

Attempts are being made to obtain hybrids from the American and Chinese chestnuts. It is hoped to combine the blight resistance of the Chinese species with the timber characteristics of the susceptible American species. First generation hybrids have been obtained, with promising growth during the past ten years and intermediate resistance, but the annual production of the hybrids is very low.

1380. JENTYS-SZAFEROWA, J.
Analysis of the collective species *Betula alba* L. on the basis of leaf measurements. Part I. Aim and method of the work on the example of *Betula verrucosa* Ehrh.
 Bull. Acad. Polon. Sci. Lettres, Cracovie 1949 : Sér. B : Pp. 214.

Biometric studies have been begun by the author in order to clarify the taxonomic position of the species at present included in the collective species *B. alba*. The analysis is based upon the leaf characters of vegetative dwarf shoots. The first species to be investigated was *B. verrucosa*. Samples were compared with regard to 16 characters of the leaf, by demonstrating graphically the ratio of the arithmetic means of a sample covering the whole area of distribution of the species in Europe. The following conclusions were reached: (1) *B. verrucosa* displays small local variability in leaf size and slightly larger variability in leaf shape; (2) a correlation exists between the base angle and position of the widest part of the blade on the one hand and a whole series of leaf characters on the other, with the result that the leaves possess very characteristic and well-defined shapes; (3) the leaves show considerable innate variability in the lower half of their blades; and (4) the species exhibits characteristic local variability in leaf shape. In addition, all the samples of *B. verrucosa* analysed were compared with a sample of *B. pubescens* covering the whole area of European distribution of the latter species.

1381. PRYOR, L. D.
A hybrid *Eucalyptus*.
 Proc. Linn. Soc. N.S.W. 1950 : 75 : 96-98.

Trees, believed to represent naturally occurring hybrids between *E. pauciflora* and *E. dives*, are described. The putative hybrid has been described in the literature as *E. vitrea*.

1382. PETROV, E. M.
(More intensive breeding work with rowan is necessary).
 Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 8 : 56-59.

The results of chemical analyses of the sweet *Sorbus* varieties cultivated in the USSR are given. The most important of these are five Mičurin varieties and three forms of the Nevežinskaja rowan: Kubovaja [Cube], Želtaja [Yellow] and Krasnaja [Red].

1383. HIRAYOSHI, K.
(Forest tree systematics. II).
 Seiken Jiho (Biological Report) 1942 : No. 1 : 88-90.

This article includes the following haploid chromosome counts: *Torreya nucifera*, $n = 11$; *Podocarpus macrophyllus*, 11; *Pinus densiflora*, 12; *Sciadopitys verticillata*, 10; and *Chamaecyparis obtusa*, 11.

1384. CHAMPION, H. G.
Tree breeding and seed supplies in North-West America with special reference to Douglas fir (*Pseudotsuga taxifolia* Brit).
 Forestry 1950 : 23 : 69-77.

The development of tree breeding on the Pacific coast of North America is reviewed briefly, with special reference to provenance experiments with Douglas fir at the Pacific North-west Forest Experiment Station, Wind River, Oregon.

It was noted at Placerville, Calif., that different stocks of *Pseudotsuga taxifolia* differed in their susceptibility to *Adelges cooleyi*. Results of pine hybridization work there have shown that production of fertile interspecific hybrids occurs readily. Hybrid vigour is evident in the crosses *P. monticola* x *P. Strobus*, *P. monticola* x *P. excelsa* and *P. Strobus* x *P. excelsa*. Crosses between geographical races of *P. ponderosa* do not show hybrid vigour, which appears to be associated more with crosses between closely related species. A five needled pine resistant to blister rust has been obtained at Placerville from *P. Peuce* x *P. Strobus* L., and from crosses involving *P. Jeffreyi* and *P. Coulteri*, which also show hybrid vigour. Bulk production of hybrid seed is taking place for the release of F_1 generation hybrids. F_2 generations showing sufficient of the desirable F_1 characteristics suffice to justify natural regeneration.

VEGETABLES

1385. KRICKL, M.

Züchtungs- und Versuchsarbeiten mit verschiedenen Gemüsearten.
(Breeding and testing various kinds of vegetables).
Bodenkultur, Wien 1950 : 1. Sonderheft : 177-86.

By selection, cabbages were obtained in which the ratio of the stalk included within the head to the total length of the cabbage was greatly reduced. The possibility was demonstrated of growing cabbages with a short rounded internal stalk or practically none; such cabbages are compact in form. The cabbages used for the above work showed excellent keeping properties and will therefore be used in future breeding.

It is hoped to improve the Austrian radish varieties, so that even with spring cultivation in the open they will give radishes free from sponginess if harvested within 20 days from maturity. Of ten varieties tested, Riese von Aspern [Aspern Giant] alone showed no sponginess within the test period.

In carrots, the size of seed, 1000 seed weight and development of the root were found to be interrelated. Moreover, the larger and heavier the seeds, the higher is the percentage of high grade carrots.

Results obtained with shallots showed the possibility of breeding shallots which can be planted in autumn and yet will not shoot later.

1386. LESLIE, W. R.

Manitoba news letter.
N.S. Dak. Hort. 1950 : 23 : p. 136.

Strawberry

The objectives of strawberry breeding at the Morden Station are summarized. Within 15 years over 90 named varieties have been tested. At present 170 seedlings from controlled crosses made at the Morden Station and over 30 numbered seedlings from elsewhere are being evaluated. Hardiness has been increased and flavour improved by crossing commercial varieties with *Fragaria virginiana* but objectionable features of the hybrids are small fruit size, soft flesh with poor handling qualities and excessive runner production. More progress seems likely from crosses of such varieties as Valentine and Burgundy with selections derived from crosses of seedlings of the Rocky Mountain strawberry (*F. ovalis*) with Fairfax and Dorsett, made at Cheyenne, Wyoming.

There has been some progress in combining disease resistance with desirable plant and fruit characters. Leaf spot resistance has been found in Dunlap and Premier and resistance to drought and root rotting in seedling O-263.

The method of breeding to isolate the desired characters followed by their synthesis into a single variety is considered promising.

Rhubarb

The objectives of the improvement programme are outlined. The approach, at present, is to self-pollinate Valentine plants and select for desirable types among the seedlings.

Melon

Early maturing and pleasantly flavoured varieties are being developed. The male flowers are picked early in the morning before insects feed on the pollen and are stored in a cool, dark place before being used for pollination at about 4 p.m.

Other vegetables

Desirable types of cucumbers, squashes and pumpkins having the bush type of growth are being sought. The progeny of crosses between bush and vining types usually have vines of variable length and bush selections are not easily obtained.

Tomato

Promising material is being obtained in breeding for stiff stemmed plants which hold their fruits off the ground.

1387. KNOTT, J. E. and
LORENZ, O. A.
Vegetable production.
Advanc. Agron. 1950 : 2 : 113-55.

The survey of vegetable production in the USA includes sections on the development of new varieties and utilization of heterosis.

1388. YEAGER, A. F.
Breeding improved horticultural plants. I. Vegetables.
Bull. N.H. Agric. Exp. Sta. 1950 : No. 380 : Pp. 23.

A survey is given of vegetable breeding work carried out on the following crops in recent years at the New Hampshire Agricultural Experimental Station.

Red pepper

Merrimack Wonder has given good results (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1128).

Carrot

A cross between Hutchinson and Morse's Bunching is being selected to develop a variety combining good yielding capacity and quality.

Cabbage

Crosses have been made between various members of the cabbage family including cabbage, kohlrabi, kale, Brussels sprouts, cauliflower and broccoli. No varieties have resulted but the characteristics of the hybrids have been recorded. Red cabbage has been crossed with the Chinese cabbage Wong Bok, the latter forming the female parent; the single plant from the cross is large, leafy, red veined and nearly or possibly completely sterile.

Musk melon

The variety Granite State, from a cross between a selection of Honey Rock from the Michigan Agricultural Experiment Station and a selection from southern Manitoba, has been released (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1943). Further breeding work attempts to combine (1) the perfect flowering habit of an introduction from India (236-B) and the high quality of named American varieties, and (2) the earliness of the melon Korean Sweet and the medium size and thickness of flesh of Granite State.

Water melon

The variety New Hampshire Midget (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1943), introduced in 1947, was developed from the breeding stocks which yielded White Mountain (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1127) and involved a Japanese variety. The introduction of Colebrook, a variety collected in Korea and known in the East as Shingyamato, is planned; its fruits each weigh about 10 lb. and have fairly thick, striped rinds, bright red flesh, small brown seeds and high quality.

Squash (*Cucurbita maxima*)

Baby Blue was developed from a cross between Bush Buttercup (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 564) and Blue Hubbard. It is a new bush type, producing fruit weighing 3 to 4 lb., with a thin hard rind and bright orange flesh.

Tomato

The newer varieties developed comprise: Orange Chatham, primarily a novelty variety, from a cross between Chatham and Orange King; Windowbox (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1128), from a cross between Dwarf Champion and Redskin; Tiny Tim (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1128), from a cross between Windowbox and Red Currant; Dixville, a large fruited variety slightly earlier than Chatham, involving in its parentage Victor, Redskin and a very early, determinate small fruited type designated BV 5; and High C with a vitamin C content double that of standard varieties, bred by crossing Michigan State Forcing and *Lycopersicon peruvianum* and subsequent back-crossing to named varieties. Older varieties described are Chatham or Home Garden, Orange King and New Hampshire Victor (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 1114). Breeding for high vitamin C content is being continued.

Egg plant

The variety New Hampshire was bred from a cross between Extra Early Purple Dwarf and Black Beauty and is now grown commercially in New Hampshire as the earliest available variety.

Beans

The shell bean varieties Brilliant and Flash, characterized by highly coloured pods and seeds, were produced from a cross between Gage and French (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1127). Crosses of Littleton and Pittsfield with Flash have been selected for bush habit, earliness, long pods, bright coloured and large seeds and good yielding ability; promising selections are under test.

Snap bean breeding has resulted in Tiny Green, a variety with small pods which can be canned whole (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1485). Crosses involving Tiny Green, Tendergreen and Refugee and other varieties are being selected with a view to developing a snap bean with good colour and yielding capacity, which can be harvested easily, possibly mechanically. In this material association between white flowers, white seeds and good colour in the canned product has been noted.

In runner bean breeding, crosses have been made between common bean and white seeded selections of *Phaseolus multiflorus*. Some highly fertile F_4 selections combining some of the characteristics of both parents have been secured; further selection is being carried out with a view to producing a variety with improved flavour and hypogeal germination.

The Lima bean White Mountain Bush, selected from breeding material obtained from the US Department of Agriculture, possesses large pods and seeds, bush habit and ability to produce a good crop under cool climatic conditions. The Lima bean Cowey Red has been selected from a sample supplied by S. D. Cowey of York Beach, Maine; it is a bush variety with a red seed and a season similar to that of Henderson Bush, and appears to possess the ability to germinate under colder conditions than most Lima beans; it has immediate practical value as a novelty variety but probably its chief use will be in breeding.

Peas

Selection of a cross between Lincoln and Radio has resulted in Mayflower (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1485).

Popcorn

Popinjay, derived from selections of a cross between Pinky and New Hampshire Pearl, has attractive ears of varied colours, good popping quality and early maturity. More recently, breeding work has resulted in Carnival, developed from selections of a cross between Popinjay and Golden Tom Thumb. Carnival has a yellow endosperm underlying the varied aleurone colour and is thus even more attractive in appearance than Popinjay; it is also earlier in maturity.

1389. JOHNSTONE, F. E. (JUN.).

Vegetable variety trials and breeding 1949. 35th Annual Proceedings of the Ohio Vegetable and Potato Growers Association 1950 : 51-55.

Lettuce

Some of the new varieties showed promise in variety trials.

Celery

Variety trials were conducted and a breeding programme was started with the object of developing an adapted variety with the quality of California and Colorado.

Tomato

The aim of the breeding programme is the development of greenhouse varieties with improved horticultural characters, disease resistant varieties for both greenhouse and outdoor cultivation and types for canning and early outdoor types resistant to cracking. In comparative tests, two new F_2 hybrids proved too variable to be of much value. Line OSU 3-1 yielded well and appeared to have definite resistance to cracking. RS 6-6-1, developed by I. C. Hoffman was sufficiently outstanding to warrant its inclusion in commercial tests. Data on varietal resistance to fruit cracking are presented. The more resistant types have been crossed with standard varieties and many of the hybrids have been back-crossed or selfed. The inheritance of resistance to cracking is also being studied. Some of the first generation crosses have been observed for possible use as hybrid varieties; one showed promise as a canning type.

Sweet corn

Varietal tests are reported. There appears to be a close correlation between earliness and yield.

1390.

(P. G. Šitt).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 2 : p. 27.

This obituary notice of the late professor of horticulture at the Timirjazev Agricultural Academy contains references to his contribution to Mičurinite materialist biology.

1391. GENEVOIS, L.

Auslese von vitaminhaltigen Gemüsen, Früchten und Pflanzenfetten.

(Selection of vitamin containing vegetables, fruits and vegetable oils).

Arch. Dtsch. Landw.-Ges. 1950 : 5 : 22-40.

Amongst the subjects discussed are: the classification of vitamins, their synthesis and effects; the results obtained by various investigators by selection of varieties of vegetables and fruits for high content of vitamin C; and the plant sources of vitamin E and of the vitamins of group B.

1392. ALBAN, E. K.

2,4-D studies in the greenhouse. 34th Annual Proceedings of the Ohio Vegetable and Potato Growers Association 1949 : 35-43.

Notes on the differential response to 2,4-D treatments of varieties of onions, peas, snap beans, Lima beans, sweet corn and asparagus are included.

1393. LAMM, R.,
TOMETORP, G. and
HINTZE, S.

Klassificerande sort- och stamförsök med köksväxter 1945-1949.

(Classificatory variety and strain trials with vegetables 1945-49).

Medd. Stat. Trädgårdsförsök 1950 : No. 58 : Pp. 46.

Försök med köksväxter. (Trials with vegetables).

Försök och Forskning 1950 : 7 : 74-75.

In this report the results of controlled trials in Sweden of varieties and strains of peas, cucumbers, cauliflowers, musk melons, carrots, parsnips, radishes and spinach are recorded

in detail. Lists are included of (1) first class elite varieties and strains and the firms producing them, and (2) first class varieties and strains for which no proprietor is mentioned. The dark green, short necked, greenhouse cucumber Rameses Aln/49, in the first class group, probably arose by inbreeding from a self pollinating plant of Rochford LD/47 which had shown marked vigour, very large leaves and fruits different from the parent type and without any marked tendency to bitterness.

The parsnip Student Ge F/49 approved as a first class strain was obtained by selection after crossing a Danish and a Swedish strain. It is high yielding, with a relatively high percentage of roots with hollow crowns, and its slender core ensures a vegetable of good table quality.

1394. HARTMAIR, V.

Bericht über die Tätigkeit der Bundesanstalt für alpine Landwirtschaft in Admont im Jahre 1948. G. Das Referat für Gemüsebau. (**Report on the work of the Federal Institute for Alpine Agriculture in Admont in the year 1948. G. The report on vegetable culture**). Veröff. Bundesanst. alp. Landw. Admont 1950 : No. 3 : 57-83.

The choice of suitable varieties and their periods of growth in Alpine districts were investigated. The yields, earliness of ripening and tendency to bolting are shown in tables for varieties of cabbage, cauliflowers, kohl rabi, lettuce and garden beet. The effects of high altitudes on varieties of carrots, radishes, peas and onions were also studied; there seem to be no onion varieties suitable for mountain districts. The production at high altitudes of white cabbage, carrots, kohl rabi and peas was investigated. Generally the results showed that the effect of altitude on quality varies with the variety. Altitude and time of sowing affect the varietal character, sugar content, of peas. Varieties of lettuce, garden beetroot, peas and dwarf beans were tested in Alpine districts for admission to the Austrian Breeding Register.

1395. BERWICK, E. J. H. and

TAN AH KING

Vegetable variety trials at Cameron Highlands in 1949.

Malay. Agric. J. 1950 : 33 : 119-35.

Trials of local and introduced varieties of root vegetables, legumes, leaf vegetables, rhubarb and sweet corn carried out at Cameron Highlands, Malaya, are reported in detail.

1396. FROLKIN, M. V.

(**New beetroot variety**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 1 : p. 72.

Reference is made to a good outdoor variety of beet, Podzimnjaja [Late Autumn], which has been recently bred at the Gribovo Vegetable Breeding Station.

1397. HOSODA, T. and

WATANABE, Y.

(**Spring sowing of the radish in the Utsunomiya region**).

Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 150-52.

The time taken for germination and flowering in a series of Japanese radish varieties is recorded.

1398. NISHIYAMA, I. and
TAKASUGI, K.

Studies on artificial polyploid plants. XII. Investigations on the growth and yield of an autotetraploid radish, Minoyonbai-daikon.

Research of Food-Science, Kyoto Univ. 1949 : No. 1 : Pp. 10. [from Heredity 1950 : 4 : p. 399].

The artificially tetraploid radish variety Minoyonbai and the standard diploid variety Minowase are more vigorous than the diploid variety Miyashige. The tetraploid is less pithy than the two diploids and has yielded better than either during 1944-47.

1399. ŽIGLINSKAJA, E. A.

(Jerusalem artichoke as a silo crop for the non-black-earth belt).

Sovetskaja Agronomija (Soviet Agronomy) 1950 : No. 7 : 79-84.

Local varieties and varieties obtained from the Osetian State Breeding Station grow vigorously in the non-black-earth zone. The capacity of some varieties, such as variety 145, for developing flowering heads promises a wider scope for the acclimatization of the plant in Russia.

1400. MOELLER, S.

(Onion varieties).

Hassadeh 1950 : 31 : 16-19.

The most popular onion variety in Israel is Excel Bermuda, which succeeds best in moist districts; Golden Bermuda ripens somewhat earlier. Sefardi Habakir [Early Spanish] was selected by K. Ulman of the Nove Yoar research station from samples of the early Sweet Spanish type introduced from the United States in 1925. Sefardi Habakir is a medium sized to large onion, conical, light golden in colour and a heavy cropper. Early Grano resembles Ulman's Sefardi Habakir but is slight broader in the upper portion of the bulb. Kristal Lavan-Shavan [White Crystal Wax] is a heavy cropper but poor keeper; it is suitable for autumn sowing. Golden Babuza resembles Sefardi Habakir. Mitzri Meshubakh [Selected Egyptian] is a large strongly flavoured onion, that succeeds best on soils rich in nitrogen. Hamaoi is a Syrian onion, pear shaped, coppery brown in colour, and susceptible to mildew and thrips. Riverseed, which withstands mildew and thrips and is a heavy cropper, has only been grown in Israel for a few years; it is gaining in popularity as is the similar variety American Spanish.

1401. MARENKOV, M. N. and

TEREHOV, P. F.

(Varieties of pungent Russian onions and their standardization in the RSFSR).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 7 : 58-61.

A more important place is given in the revised standard lists for the RSFSR to the local Russian varieties, which are remarkable for their pungency and good keeping properties. These varieties did rather well in comparative trials with introduced foreign varieties, including a large American collection. The revised lists comprise varieties producing one rather large and several smaller bulbs and varieties producing several bulbs of even size; the latter group of varieties includes Rostovskii Repčatyĭ [Rostov Bulb], a productive variety doing well on moist podzolized soils, Arzamasskiĭ, which is noted for its high yielding capacity and good size and shape of the bulbs, and Bessonovskii and Pogarskii, both early productive varieties yielding evenly shaped bulbs.

The following are the standards for the RSFSR appearing on the revised lists of the group of varieties producing one large bulb per plant: Danilovskii 301, an early, productive variety doing well in the woody zone; Msterskiĭ, a productive variety yielding good

quality bulbs, which keep well and have a rather pungent flavour; and Strigunovskii, an early variety with large attractive bulbs having a semipungent flavour.

1402. POLEŠČUK, P. M.

(**The Donbas garlics**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 7 : 61-64.

Breeding work with the local garlic varieties Ukrainskii Belyi [White Ukrainian], Jampoljskii Fioletovyĭ [Mauve Jampolj] and Starobeljskii Belyi [White Starobeljsk] at the Stalino Vegetable and Potato Breeding Station is reported.

Ukrainskii Belyi is propagated from bulbs and is noted for its good keeping properties and transportability. The bulbs weigh 20-22 grm. and have a diameter of 3.4-4 cm. The bulbs contain 10 to 14 cloves of uneven size. The better developed outer bulbils are enclosed in dark pink scales of firm texture. The cloves are pale cream, juicy and have a pungent garlic flavour.

Jampoljskii Fioletovyĭ is reproduced from bulbs and from aerial bulbils. It is hardy and has good keeping properties. The bulbs weigh 33-35 grm. and measure in diameter 4.5 cm. The bulbs contain 6-8 cloves of equal size. These are pale cream or pinkish cream and have a pungent flavour.

Starobeljskii Belyi is a hardy variety. Its keeping properties and transportability are good. The variety is reproduced from bulbs and from aerial bulbils. The bulbs contain four even large cloves; they weigh 25-28 grm. and have a diameter of 3.6-4 cm. The bulbs are enclosed in 4 to 5 thin but firm offwhite, sometimes pinkish scales. The flavour of this garlic is mild but good.

1403. SCHEFFER, R. P.

Anthracnose leafspot of crucifers.

Tech. Bull. N.C. Agric. Exp. Sta. 1950 : No. 92 : Pp. 26.

The reactions to *Colletotrichum Higginsianum* of varieties of mustard, rutabaga, Chinese cabbage and turnip, tested in N. Carolina, are indicated. The mustard variety Southern Giant Curled proved highly resistant.

The fungus has been found to consist of at least three strains, designated I, II and III, all highly pathogenic. The distinctive cultural characteristics and the apparent mating reactions of the strains are described. Differences between strains I and II as regards growth at different temperatures are also recorded.

It is suggested that breeding for anthracnose resistance should not be too difficult since a high degree of resistance is found in many crucifers and it is known that interspecific hybrids can be made.

1404. KÜHNE, H.

Die physiologischen Veränderungen einiger Wertstoffgehalte der Kopfkohlarten (*Brassica oleracea* L.) während der Winterlagerung im Mikro-Lagerungsversuch. [**The physiological changes in the contents of some valuable constituents of different kinds of cabbages (*B. oleracea* L.) during winter storing in microstorage experiments**].
Züchter 1950 : 20 : 226-52.

Nine varieties of cabbage were tested under conditions of microstorage. The changes in weight of fresh and dried material, and the total amounts of nitrogen, protein, ash and vitamin C were determined.

The usual varieties grown for storing were superior to autumn varieties as regards vitamin C content after storage. In all the varieties except Frührot [Early Red], a negative correlation was found between the change in content of dry substance and of vitamin C and also between the content of dry substance and of ash in the case of white and red cabbages. A positive correlation was found between the content of dry substance and keeping properties in white and red cabbage varieties.

1405. MINDERHOUD, A.

Het gebruik van bijen en hommels voor bestuiving in afgesloten ruimten.

(**The use of bees and bumble bees for pollinating in closed spaces**).

Meded. Inst. Vered. Tuinbouw., Wageningen 1950 : No. 17 : 32-39.

Four years of experimentation have shown that, for the cruciferous plants tested, plots not less than 30 m.² in area and at least 125 m. or more apart are not visited by the same lot of bees; experiments with bumble bees led to a similar conclusion. Cross pollination is therefore unlikely, but in order to exclude any possibility of crossing, at least 200 m. should separate the plots.

Small colonies of bees kept in glass compartments 3 x 4 m.² in area proved effective in ensuring fertilization of cabbage varieties.

In small glass cages containing only two plants of cabbage, radish, chicory or endive, bumble bee queens, affected by *Sphaerularia bombi*, or male bumble bees proved effective pollinators.

1406. KVASNIKOV, B. V.,

OSNICKAJA, E. A. and

DEMSENKO, A. I.

(**The resistance to club root of cabbage varieties**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 6 : 51-53.

Breeding cabbage for resistance to club root has begun at the RSFSR Scientific Research Institute for Vegetable Farming.

Infection trials conducted at the institute showed that the local Russian cabbages were less susceptible to the disease than those derived from west European varieties.

The least susceptible late varieties were Moskovskaja Pozdnjaja [Late Moscow], Slavjanka [Slav], Ladožskaja [Ladoga], Vasiljevskaja, Kaširka, and Zimnjaja Gribovskaja [Winter Gribovo]; Klykovskaja, Belorusskaja [White Russian] and Lebjažinskaja showed the best resistance among the mid season varieties, and Valjvatjevskaja among the early cabbages. The hybrid Valjvatjevskaja x Nomer Pervyi [Number One] was more susceptible to the disease, and, despite its hybrid vigour, less productive than Valjvatjevskaja.

1407. LEBEDEV, F. K.

(**Vegetable growing on the alluvial Don soils**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 2 : 43-45.

The varieties of cabbage doing best on alluvial soils in the Rostov province are the mid-early Slava Enkgoizena [Enkhuizen's Glory], and the medium late varieties Likuriška, Birjučevskaja 138 [Birjučii Kut 138] and Braunšveigskaja [Brunswick].

The melon Kolhoznica [Collective Farmer] and the water melon Ažinovskii are the principal cucurbits cultivated.

The most extensively cultivated tomatoes are the Birjučii Kut varieties Srednespelyi 20 [Mid-season 20] and Srednespelyi 416, Sredneranni 414 [Medium Early 414] and Skorospelyi 68 [Early 68].

1408. TANDON, S. L. and

CHINYO, J. J.

Colchicine-induced polyploidy in *Amarantus blitum*.

Sci. and Cult. 1950 : 15 : p. 398.

Colchicine-induced tetraploids of *A. Blitum* have been obtained. The larger and more numerous leaves and longer vegetative cycle of these types may increase the value of *A. Blitum* as a green vegetable.

1409. SNEEP, J.
Enige ervaringen op het gebied van de zaadteelt. (**Observations on seed growing**).
Meded. Inst. Vered. Tuinbouw., Wageningen 1950 : No. 17 : 21-31.

Endive seed undergoes natural vernalization if the temperature falls during ripening to 10° C.

Data are given on natural crossing between *Brassica oleracea* and *B. Napus* var. *oleifera*; the hybrids produced are described.

For crossing cabbages, small hives of bees are placed in isolation glasshouses. For pair-crossing, bumble bees are used.

1410. CERNETČENKO, V. S. and
TKACENKO, F. A.
(**Intervarietal cross pollination is an efficacious method for increasing the yields of cucurbitous plants**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 7 : 55-58.

In the Ukraine, free intervarietal cross pollination between melons and between water melons has given hybrids which were earlier and more productive and yielded better quality fruits than their parent forms. The data for the most satisfactory of these crosses are tabulated.

The intervarietal hybrids of water melon obtained at the Ukrainian Scientific Research Institute of Vegetable Farming included two whose fruits were inferior in quality to those of one of the parents in the cross, and one, Belosemjačko 187 [White Seed 187] x Skvirskii Ranniï [Skvir Early], which was four days later in maturing than the male parent. The productive and early hybrids were from Skorospelka Harjkovskaja [Harjkov Early Season] x Skvirskii Ranniï, and the reciprocal cross, Ljubimec Hutora Pjatigorsk [Pjatigorsk Estate Favourite] x Belosemjačko 187, Skvirskii Ranniï x Ljubimec Hutora Pjatigorsk and Ljubimec Hutora Pjatigorsk x Stoks.

The water melon hybrids obtained at the Dnepropetrovsk Breeding station were all more productive and earlier than their parent forms. With a single exception of a hybrid from Holbert x Ak Činny, the fruit of whose female parent was of equally good quality, the flavour of the hybrid fruits was superior to that of the initial varieties. The crosses were of Melitopoljskii 60 [Melitopolj 60] x Birjučekutskii 775 [Birjučii Kut 775], Vengerskii [Hungarian] x Ak Činny, Amerikanskii Belyi [American White] x Belosemjačko 187 and Amerikanskii Belyi x Ak Činny. The hybrid melons obtained at the breeding station were from Kolhoznica [Collective Farmer] x Birjučekutskaja 713 [Birjučii Kut 713] and Zimovka 264 [Winter 264] x Kolhoznica. The hybrid from the first named cross produced an appreciably bigger crop than either parent and its fruit quality was better, but it was one day later in reaching maturity than the female parent. The hybrid from Zimovka 264 x Kolhoznica on the other hand, produced fruits of inferior quality to its male parent. It was earlier and more productive than either parent.

1411. ZAPROMETOV, N. G.
(**Bacterial rot of melon and its control**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 5 : p. 42.

The following varieties, according to Jacynina, are resistant to the disease under Uzbekistan conditions: Nesravnennaja [Incomparable], Kolhoznica [Collective Farmer], Amerikanka [American], Birjučekutskaja 713 [Birjučii Kut 713], Persidskaja [Persian], Prescott and Vokljuz.

1412. SLEESMAN, J. P. and
WILSON, J. D.

The effect of new insecticides and fungicides on the growth and yield of cucurbits. 34th Annual Proceedings of the Ohio Vegetable and Potato Growers Association 1949 : 75-79.

The plant yields of eight varieties of cucurbits subjected to dust treatment with each of six different insecticides are tabulated.

1413. H., B.
Japanese seedless watermelon.
Seed World 1950 : 67 : No. 9 : p. 12.

Seedless water melons have been produced in Japan which are F_1 hybrids between diploids and colchicine induced tetraploids of the same variety. Except for being seedless the fruit resembles that of the original variety. The few undeveloped seeds present are soft and edible like those in the cucumber. This type of water melon has been grown successfully by the Vaughan Seed Company, Chicago, from seed obtained from Japan.

1414. GREBENŠČIKOV, I.
Zur Kenntnis der Kürbisart *Cucurbita pepo* L. nebst einigen Angaben über Ölkürbis. (**Information on the pumpkin species *C. pepo* L. and some facts concerning the oil-bearing pumpkin).**
Züchter 1950 : 20 : 194-207.

An extensive survey is given of the work on *Cucurbita*, mainly on *C. Pepo*, dealing with the following aspects: the systematic classification of pumpkins, the geographical origin of *C. Pepo*, the classification of the main forms of *C. Pepo* in the collection of Cucurbitaceae at the Institute for Research on Cultivated Plants of the German Academy of Sciences, Berlin, the genetics of *C. Pepo*, the cultivation of the oil-bearing pumpkin with soft skinned seeds and the properties of pumpkin seed oil and of protein from the oil cake.

1415. SCHULTZ, J. H.
Squash and pumpkins in North Dakota.
Trans. Ia Hort. Soc. 1949 : 84 : 223-27.

Breeding work is being directed towards small fruited squash varieties of high quality, which are early maturing under the conditions of a short growing season; those already being grown commercially include Buttercup, Banquet, Baby Blue, Rainbow, Table Queen, Table Queen Bush, Uconn, Dakota and Small Sugar.

1416. HEINISCH, O. and
RUTHENBERG, M.
Die Bedeutung der Samenschale für die Züchtung des Ölkürbis. (**The importance of the testa in oil pumpkin breeding).**
Z. Pflanzenz. 1950 : 29 : 159-74.

An anatomical and histological study of the structure of the seed in varieties and species of *Cucurbita*, including the *C. Pepo* mutant with a soft testa, has demonstrated that in the mutant, all the layers of the testa are present but thickening and lignification of the cell walls has not taken place. Intermediate forms also occur in which lignification (1) though present and uniformly distributed, is not marked, or (2) is limited to the margin of the seed. In *Sechium* absence of lignification is the normal condition, and deficient lignification may occur occasionally in forms of *C. Pepo* and *C. maxima* which otherwise have normal seed coats.

Possibly, in view of the marked tendency to parallel variation in the Cucurbitaceae, the soft seeded mutation might either occur naturally or be induced in cultivated forms of *C. maxima* and *C. moschata*.

Seeds with soft testas showed inferior germination capacity as compared with normal seeds. The literature of the subject is reviewed and the designation *brevicaulis malakosperma* is suggested for forms with soft coated seeds and short stems.

1417. SMOLEĬ, V. JA.

(A new cucumber variety Avangard*).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 4 : 92-93.

A new variety of cucumber, Avangard, showing promise in the Primorskiĭ and Habarovsk territories and in the Kalinin province, has been bred at the Far Eastern Research Station of the USSR Institute of Plant Industry. It was obtained by natural cross pollination of two early individuals of two local early season varieties and by continued selection of their progeny for earliness, productiveness, quality, flavour and resistance to diseases. Throughout the different stages of selection the plant material was trained upon good soils.

In comparative trials with Muromskii [Murom], Avangard outyielded that variety appreciably, producing 250 c. higher grade fruits per ha. than Muromskii, which outyields only 91 c. per ha. Avangard was as early as Muromskii. In trials with the standard Dal'nevostochnyi 6 [Far Eastern 6], Avangard was 6 days ahead of the standard and produced more fruits for early picking. In the Kalinin province the new variety was 30% more productive than the cultivated local varieties.

Avangard shows resistance to diseases and its fresh and salted fruits have good flavour. The fruits weigh 95 gm. and are 12 cm. long and have a diameter of 4 cm. They are spindle shaped and three sided. The surface of the fruits is ribbed and uneven. The protuberances are of medium size and widely spaced. Mature fruits for the seed production are 20 cm. long and have a diameter of 7 cm. Their colour is brownish. One plant will produce 2 to 5 of them. The leaves are bright green, heart shaped and with small incisions. The tendrils are between 100 and 133 cm. long.

1418. SUHAČEV, A. D.

(Growing cucumber seed).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 4 : 63-66.

Experiments made at the Kuibyshev Agricultural Institute suggested that selection of cucumber seed for higher specific weight improved the productiveness of the varieties Muromskii [Murom] and Boston. The heavier seed had a higher percentage viability and the plants obtained from it produced more and larger fruits. The 1000 seed weight of the first generation grown from the heavy seed was higher than that of the first generation from the lighter seed.

1419. ABREU, J. DA P. and

SILVA, J. J. F. E

Descrição botânica e classificação de algumas formas cultivadas de tomateiro (*Solanum Lycopersicum* L.). [Botanical description and classification of some cultivated forms of tomato (*S. Lycopersicum* L.)].

Stud. Inform. Téc. Direcç. Ger. Serv. Agríc. Lisboa 1948 : No. 33 : Pp. 65.

Botanical descriptions are given of the more important tomato varieties grown in Portugal. Keys are provided for identification.

1420. SCHERMERHORN, L. G.

Introducing "Queens," early market tomato for New Jersey.

Hort. News, N.J. 1950 : 31 : 2307, 2314.

A new variety Queens has been developed by selection from a cross between Valiant and Rutgers. It ripens earlier than Rutgers and produces a heavy crop of uniform, high quality fruit whose small loculi provide firmness.

1421.

New early tomato variety adapted to northern areas released by Wisconsin.

Crops and Soils 1950 : 3 : No. 3 : p. 25.

Early Scarlet, a new tomato that reaches its maximum yield a week or ten days before the variety Stokesdale and produces the same total yield has been released. The abundant foliage protects the fruit from sun scald.

1422.

CAPINPIN, J. M. and

CAUTON, S. C.

Study of Mendelian biotypes in the segregating generation of tomato hybrids.

Philipp. Agric. 1948 : 32 : 31-44.

Segregation of plant and fruit characters in the F_2 of the crosses Native x Susong Katabaw and Native x Kamatis na Ligaw was analysed.

The F_2 of Native x Susong Katabaw segregated into plants with a tall or branched habit. The tall habit, inherited from Native, was dominant to branched, and determined by a single gene. In the cross Native x Kamatis na Ligaw, spreading growth habit was apparently dominant over less spreading and dependent upon a single factor. The F_2 of Native x Susong Katabaw segregated in the ratio of 3 : 1 for normal and fasciated plants. The fruits of the F_2 of Native x Kamatis na Ligaw showed a ratio of 3 ridged to 1 non-ridged. In the F_2 of both hybrids the multilocular character was dominant over the bilocular and showed a monofactorial inheritance. The F_2 hybrids of Native x Susong Katabaw possessed the valuable characters of early maturity, increased number of fruits as compared with Native, and normally shaped, multilocular fruits. Possibly valuable selections may be obtained from this hybrid.

1423.

TULJŽENKOVA, F. F.

(Varietal trial of tomatoes cultivated under cover in the extreme north).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 2 : 46-50.

The results of trials with tomatoes grown in glasshouses under arctic conditions at the Narjjan-Marskaja, Salehard, Berezovskaja and Verhojansk research stations are reported. All the principal Soviet varieties and the following hybrids were included in the trials: Bison x Partisan, Mičurinskii Želtyi [Yellow Mičurin] x Bison, Bison x Pervaja Žatva [First Harvest] and Bison x Budennovka [Budennyi]. The varieties Bison, Lučšii iz Vseh [Best of All], Gruntovyi Skorospelyi Gribovskii [Early Outdoor Gribovo], and Gruntovyi Gribovskii [Outdoor Gribovo] gave the best account in all trials, although their order within this group varied according to the type of glasshouses and frames used. The Gribovo varieties were remarkable for their resistance to fungous diseases and Bison for its productiveness.

1424.

HOFFMAN, I. C.

Further tests of F_1 hybrid tomatoes in the greenhouse. 34th Annual Proceedings of the Ohio Vegetable and Potato Growers Association 1949 : 138-42.

The results of spring and autumn tests of F_1 tomato hybrids in comparison with well known varieties are presented. No outstanding high yielding hybrid has been developed so far.

1425.

CAPINPIN, J. M. and

SISON, J. M.

Heterosis in tomato.

Philipp. Agric. 1947 : 31 : 23-33.

Heterosis was investigated in the F_1 generations of the crosses Native x Susong Kalabaw and Native x Kamatis na Ligaw; Susong Kalabaw is described as a plum type and Kamatis

na Ligaw as a wild cherry type. The percentage of germination of hybrid seeds was higher than in the parents. Both hybrids flowered and fruited earlier than their respective parents. The flavour of the better tasting parents was imparted to the hybrids; it was also noted that both hybrids possessed better keeping quality under ordinary room temperature than their parents. Each hybrid produced considerably more fruit than Native but less than the male parent. The F_1 of Native x Susong Kalabaw is recommended for the practical utilization of hybrid seed. The other hybrid is not recommended; although it was 14 times more productive than Native its fruits were comparable in size only to out of season culls of this variety.

1426. BREŽNEV, D. D.

(The effect of environmental conditions upon changeability of varietal characters in tomatoes).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 7 : 49-55.

The effect of different environments upon morphological, biological and biochemical changes in tomatoes was studied at the USSR Institute of Plant Industry. The plant material comprised practically all Soviet standard varieties, but the results reported in this paper relate to the 16 most important industrial varieties. In these experiments specimens of the same variety, of identical origin, were cultivated at different locations, i.e. at the Maikop Research Station, Krasnodar territory, and at the Puškin Research Station, Leningrad province. Some of the experiments were conducted also at the Dokučayev Institute for Agriculture.

Changes in the type of inflorescence resulting from the varied external conditions were much less significant than changes in the size and shape of the fruits. The number of locules in the fruits of several varieties also changed as a result of a different environment. Most varieties tended to produce fruits with many locules when they were grown at Puškin and were pruned. Earliana, which bore fruits with more locules when left unpruned and grown at Maikop, was a notable exception.

Similar changes were observed regarding the lengths of growth periods depending on whether the varieties were cultivated at Puškin or Maikop. In most instances the varieties grown at Maikop were earlier than those grown at Puškin. Pruning or its omission had also some effect upon the lengths of the growth periods of the varieties cultivated at Puškin. Biochemical analyses established that appreciable quantitative changes in dry matter content occurred as a result of different environments in all varieties except Bonny Best, Budennovka [Budennyi], Derbentskii [Derbent], Štambovyi Alpatjeva [Alpatjev's Determinate] and Anait. Changes in the content of total sugars, acids and vitamin C were also recorded. The most striking increases in vitamin C content were obtained in varieties Lučšii iz Vseh [Best of All], Derbentskii and Kubanj when they were grown at Puškin. In most varieties the vitamin C content was higher at Puškin than at Maikop.

1427. JOHNSTONE, F. E. (JUN.).

The problem of tomato fruit cracking. 34th Annual Proceedings of the Ohio Vegetable and Potato Growers Association 1949 : 80-84.

It is pointed out that tendency to fruit cracking is a heritable character and varieties differ in their tendency to crack under any given set of environmental conditions. There are at least two types of cracking, radial and concentric, which are genetically distinct. So far, F_1 hybrids tested in Ohio have given disappointing results as regards resistance to cracking, but the evidence indicates that this character can be combined with other desirable factors.

1428. SEMERINOVA, A. G.

(The difference in quality of cucumber and tomato seed from the same plants).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 6 : 53-55.

Experiments at the RSFSR Institute for Vegetable Farming indicated that the heritable properties of the seed varied according to the position of the fruits upon the plant.

The seed of the Nerosimyĭ [Non-irrigated] cucumber taken from earlier matured fruits borne on the central vines gave more productive plants with more early fruits than plants grown from the seed taken from the secondary vines.

The best seed of the tomato variety Bison-639 was from the fruits on the second and third branches and the earlier maturing fruits of the first branches. Such seed gave more productive plants and plants bearing higher percentages of red fruits.

1429. KÚTHY, S.

Paradicsomminösítési kísérleteink néhány tanulsága. (**Some conclusions from our experiments on the grading of tomatoes**).
Agrártudomány, Budapest 1949 : 1 : 289-92.

Tomato crops in Hungary for 1947 and 1948 were analysed. Varieties are compared for: dry weight, total organic acid content, total sugar content, vitamin C content and pH. It is provisionally concluded that, in tomatoes, variation in these characters is conditioned more by external circumstances than by the variety used.

1430. BUSHNELL, J.

Reducing the cracking of staked tomatoes. 35th Annual Proceedings of the Ohio Vegetable and Potato Growers Association 1950 : 114-18.

Data on the yield, percentage of first grade fruits, weight per 100 fruits, plant height and fruit colour are tabulated for 12 varieties grown at Washington County Experiment Farm in 1949. Varieties with short internodes and dense foliage are less subject to cracking than the normal, taller varieties.

1431. ETTINGER, J.

(**New tomato varieties**).
Hassadeh 1950 : 30 : p. 683.

The varieties Marmande, Bounty and Early Chatham are discussed. A more recent introduction is Tatura, an earlier variety than Marmande. Garden State has only been grown in Israel for two years. The quality and size of its fruit and the fact that it has shown mould resistance in the United States brighten its prospects in the country. Another disease resistant variety with a high dry matter content for processing, is Pearson. This tomato is to be tested in various parts of Israel.

1432. OZOLINA, I. M.

(**New tomato varieties for culture under cover**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 6 : 49-50.

Breeding work with tomatoes for cultivation under glass at the Čeljabinsk Fruit and Vegetable Research Station is reported. Two new varieties were obtained by breeding methods involving individual selection, group selection, intervarietal hybridization and directed training under glasshouse conditions.

Tepličnyĭ Rozovyĭ 23 [Glasshouse Pink 23] is a week earlier than Budennovka [Budennyĭ]. It bears large, pink, smooth fruits, which are remarkable for their good flavour and uniform maturation.

The fruits are born in bunches of five. The plants are semiprostrate and 120-150 cm. tall. The yielding capacity is 14-17 kg. per m.².

Tepličnyĭ Determinantnyĭ 12 [Glasshouse Determinate 12] is as early maturing as Tepličnyĭ Rozovyĭ 23. It bears large, red, ribbed fruits growing in bunches of four. The

fruits mature uniformly. The variety yields 8–10 kg. fruits per m.². The plants are semi-upright and 53–90 cm. tall.

1433. FREIVALJD, E. F.

(The Kerčenskii Suhodoljnyi* tomato).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 3 : p. 78.

A local Odessa variety of tomatoes which has supplanted all other varieties on the Kerčj peninsula is described. It is grown outdoors in April using a mixture of germinating seed, soaked seed and dry seed, the latter being used as a precaution against late frost injury. The variety has a vigorous branching habit. The fruits are round, trilobular, bright reddish-orange and weigh 30 to 50 gm. Its first fruits are frequently quadrilobular, flattened, and weigh 90 gm. The skin is firm and thick and readily detachable from the flesh. The flesh is compact, very sweet and juicy. The fruits keep well in storage and in transport. Kerčenskii Suhodoljnyi is a mid-season variety and under the conditions of the Azov littoral it is as early as and more productive than other early varieties. The good properties of the variety are its productiveness, resistance to drought, moderate requirements, and the keeping properties, transportability and quality of its fruits. Trials of the variety in the arid districts of the USSR where tomatoes could not previously be grown without irrigation are suggested. It is considered that the variety would provide useful breeding material for crosses with the large fruited processing varieties in the Kubanj, Moldavia, and the southern Ukraine.

1434. CÁSSERES, E. H. and

LINARES, P. J.

Producción de variedades de tomates para los trópicos húmedos.

(Production of tomato varieties for the humid tropics).

Turrialba 1950 : 1 : 7–11.

Tomatoes are being bred at Turrialba, Costa Rica, for resistance to *Phytophthora infestans* and adaptability to hot and humid conditions. The variety Turrialba (Cuban Marglobe x a wild Costa Rican tomato) gives superior yields under such conditions. Higher yielding lines have been obtained from Turrialba x Bonimar, Turrialba x No. 2313 (a wild Colombian tomato) and Bonimar x No. 2313. No lines resistant to *Ph. infestans* have yet been obtained.

1435. BROCK, R. D.

A search for resistance to defoliation by *Alternaria solani* in the genus *Lycopersicon*.

J. Aust. Inst. Agric. Sci. 1950 : 16 : 90–94.

Artificial inoculation tests were carried out on 110 varieties of *L. esculentum*, 17 lines of *L. pimpinellifolium*, 20 lines of *L. peruvianum* and 2 lines of *L. hirsutum* to determine their reaction to *A. Solani*. Inoculation was effected by spraying seedlings with a mycelial suspension of the fungus. No resistance was detected in any of the species and varieties examined.

1436. KRAUS, J. E.

Tomato yield and grade as affected by variety, irrigation and fertilizer.

Bull. Idaho Agric. Exp. Sta. 1949 : No. 277 : Pp. 14.

The results are presented of varietal tests conducted in Idaho from 1945 to 1948. Observations on disease resistance are included. Some single plant selections of the variety Moscow were included in the 1948 yield trials and gave promising results.

* Kerčj Dry Soil.

1437. REYNARD, G. B. and
PORTER, D. R.
Here's the story behind Emerald okra.
Seed World 1950 : 67 : No. 6 : 38, 47.

The variety Emerald was developed by the Campbell Soup Company, Camden, NJ, from crosses involving Campbell's Long Green, Clemson Spineless, Louisiana Green Velvet and Cow Horn. It is a round podded type with an attractive and persistent dark green colour both as a fresh and canned product. Its pods possess thick uniform walls and thus break much less in cooking than the pods of other varieties.

1438. CHOPINET, R. and
TRÉBUCHET, G.
Essai de classification et d'identification des principales variétés de haricots cultivées en France. (**An attempt to classify and identify the principal varieties of kidney beans cultivated in France**).
Rev. Hort., Paris 1948 : 120 : 230-42, 257-65, 306-12, 352-58, 381-86;
1949 : 121 : 28-29, 55-57, 80-81, 102-03, 131-33, 165-69; 1950 : 122 :
54-55, 88-90, 119-22.

An introduction, dealing with the classification of beans in general, as represented by various genera of economic importance, is followed by an extensive survey of varieties of *Phaseolus vulgaris*. In addition to descriptions of the morphological, vegetative and physiological characters of the plant and beans, diagnostic tables are given for the identification of the varieties, whose characteristics include numerous variants due to mutations that have arisen from time to time in cultivation. The illustrations include a number of plates showing the varietal differences in size, shape and colour of the beans without their pods.

1439. THOMAS, H. R. and
ZAUMEYER, W. J.
Inheritance of symptom expression of pod mottle virus.
Phytopathology 1950 : 40 : 1007-10.

The inheritance of reaction to the pod mottle virus was studied in the F_1 , F_2 and F_3 generations of intervarietal bean crosses. Expression of symptoms depended upon a single pair of factors. Plants with the dominant factor showed susceptibility to a local lesion type of infection; homozygous recessive plants developed a systemic mottle.

1440. COUTINHO, L. DE A.
Observaciones cariológicas en un híbrido de *Vicia Faba* L. (**Caryological observations in a hybrid of *V. Faba* L.**).
Genetica Iberica 1950 : 2 : 83-100.

A cytological study was made of a form believed to be a hybrid between two bean varieties differing in the structure of the M chromosome and in one cephalobrachial chromosome. The observations noted in the hybrid included imperfect pairing, fragmentation and anomalies believed to be due to derangement of the chromosome matrix.

1441. MCGREGOR, W. G.,
MACLEAN, A. J. and
WALLEN, V. R.
Field beans in Canada.
Fmrs' Bull. Dep. Agric. Ottawa 1950 : No. 164 : (Publ. 843) : Pp. 16.

Descriptions of field bean varieties are included, supplemented by information on their adaptation in the different provinces of Canada.

1442. MALINOWSKI, E.

The problem of heterosis. IV. Inheritance of vigorous growth.

Bull. Int. Acad. Cracovie 1949 (1950) : No. 7 : Sér. B : 259-300.

The inheritance of vigorous growth has been studied in succeeding generations of the cross between *Phaseolus vulgaris* var. *melleus* and the Inexhaustible bean, using size of leaves, height of plant and weight of the dry haulm as measures of vigour. Seeds of the more vigorous plants were chosen from each generation, up to the F_{11} , for growth in the following year. Numerical data and photographs indicate that each generation was more vigorous than either the preceding or F_1 generation; the coefficients of variation for the characters under observation decreased successively, particularly in the F_{10} generation. Relatively late flowering was found in the F_{10} lines, lasting much longer than in the F_1 generation. It is considered that vigour due to heterosis is a hereditary character in *Phaseolus vulgaris*, from which relatively uniform families may be obtained after several years of selection.

1443. GLUHOV, A. I.

(The Frunze District Seed Farm).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 5 : 71-72.

A new bean variety Belosemjannaja [White Grained] yielding 22.1 c. per ha. was selected from a local Dnepropetrovsk variety. It is more productive, more resistant to shedding and less susceptible to pests than the standard Mičiganka [Michigan]. Its grains have four times the weight of the Mičiganka grains.

1444. KVASNIKOV, B. V.

(The resistance to cold of bean varieties).

Sad i Ogorod (Fruit and Vegetable Gardens) 1950 : No. 6 : p. 56.

In trials conducted at the RSFSR Institute for Vegetable Farming with different varieties of bean (*Phaseolus vulgaris*) those developed at the Gribovo and Verhne-Havskaja research stations proved the hardiest at the seedling stage. The hardiness of Severnaja Zvezda [Northern Star] and Saksa bez Volokna [Stringless Saxa] did not depend on the origin of the seed.

1445. WEBER, C. R.

The Blackhawk soybean—it's here.

Iowa Fm Sci. 1950 : 5 : 3-67—5-69.

A detailed description is given of the new variety Blackhawk which has been released to replace Habaro and Earlyana in northern Iowa and six other maize belt states.

1446. NAGATA, T.

(Studies on the summer or autumn habit of soya beans. I.

Classification of varieties in respect of summer or autumn habit).

Proc. Crop Sci. Soc. Japan 1949 : 18 : Nos. 2, 3, 4 : 131-34.

A classification of 136 soya bean varieties has been devised based on the period passed before flowering, the duration of flowering, and the time taken for seed maturation. The varieties were sown on six different dates from April to September.

1447. CAPINPIN, J. M. and

ROA, M. A. (JUN.).

An extra-early Yellow Dwarf soybean.

Philipp. Agric. 1949 : 32 : 333-38.

Information is given on the plant characteristics of the soya bean extra early Yellow Dwarf, developed from an unnamed soya bean distributed by the Emergency Control Admini-

stration during the early part of the liberation of the Philippines. The variety, which is undergoing further improvement at the College of Agriculture, Laguna, is likely to become popular on account of its early maturity. The yield of extra early Yellow Dwarf is however considerably lower than that of the control variety Ami; the yields of two cultures of the new variety may not equal or surpass the yield of one culture of the later maturing Ami.

1448. FUKUI, J. and
KATAGISHI, T.
(On varietal differences in the depth of colour of soya bean seed stained with a solution of iodine in potassium iodide, and the relation between this reaction and some other characters of the seed).

Proc. Crop Sci. Soc. Japan 1949 : 17 : No. 4 : 8-9.

Information is provided on the staining reaction with iodine, seed weight, testa colour, hilum colour and cotyledon colour of a series of soya bean varieties grown in Japan.

1449. CALMA, V. C.,
VALENCIA, I. G. and
TALE, J. V.
Effect of mass selection of the seed and of season of planting on the yield of the soybean.

Philipp. Agric. 1949 : 32 : 318-28.

A study was made to determine whether or not better yields can be obtained by using in the wet season planting, seeds selected from the crop grown in the wet season instead of those from a crop raised in the dry season. Mass selection of seeds according to seasonal planting was not found to possess any appreciable advantages; loss of viability of seeds in storage appears to be the factor controlling seed quality.

1450. CANODE, C. L. and
WEBSTER, J. E.
Soybean variety tests, 1926 to 1949.

Bull. Okla. Agric. Exp. Sta. 1950 : No. B-356 : Pp. 20.

The results of soya bean variety testing in several localities in Oklahoma during the period 1926-49 are surveyed. Tests since 1942 have indicated that Ogden (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 1007), a medium maturing variety, and S-100 (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1951), an early maturing soya bean, are the best varieties for seed production in the state.

1451. STOLL, K.
Resistenzprüfungen an Leguminosen gegenüber dem Fusskrankheits-
erreger *Ascochyta pinodella* Jones. **(Resistance tests on legumes to
the root rot pathogen *A. pinodella* Jones).**
Z. Pflanzenz. 1950 : 29 : 175-92.

After a review of the species of *Ascochyta* and the types of injury due to them, methods of artificial infection are discussed and it is concluded that Wehlberg's technique is the best for comparative tests of pathogenicity and resistance in field and greenhouse.

Experiments with a highly virulent strain of *A. pinodella* on a large collection of commercial varieties of peas showed that most of the *sativum* types were affected by rot attacking the neck of the root and the base of the stem, whereas the *arvense* types with variegated seeds remained almost free from infection.

The pronounced varietal differences in resistance observed in field experiments is attributed partly to the marked capacity for regeneration by adventitious root formation, noted in

varieties with unpigmented seeds, e.g. Saxa and Allefrüheste Mai [Earliest May]. The high resistance of some *arvense* types with variegated seeds may be largely due to the resistance of the testa to attack by fungi or bacteria. The testa in such peas is moreover resistant to maceration, as shown by experiments on the effects of *Bacillus amylobacter* culture on variegated testas, and this characteristic might, it is thought, be used in conjunction with Wehland's technique in the field and, possibly, also with tests of resistance of the testa to certain colouring matters, for a rapid preliminary estimation of breeding material for the production of *Ascochyta* resistant forms.

1452. SEN GUPTA, J. C. and
MUKHERJI, D. K.
Studies on the physiology of growth and development of mung
(*Phaseolus aureus* Roxb.): (a) effect of the time of sowing; (b)
vernalization and photoperiodism.
Indian J. Agric. Sci. 1949 : 19 : 207-54.

The variety IP 28 behaved as a long day plant whereas Sona mung showed a short day response.

1453. BARNEBY, R. C.
***Pugillus Astragalorum* XII : some problems in California.**
El Aliso 1950 : 2 : 203-15.

The identity and synonymy of *Astragalus* spp. in California are examined. Descriptions of new varieties of several species are included.

BOOK REVIEWS

BADING, H.

Wörterbuch der Landwirtschaft. Deutsch-Englisch. Englisch-Deutsch.

(Dictionary of agriculture. German-English. English-German).

Park-Verlag Classen & Goverts G.M.B.H. 1947 : Pp. 156.

Owing its origin to unusual circumstances this dictionary must have been compiled relatively quickly, but it shows none of the defects that might be expected to result from that. It was published to facilitate communication between the English and American occupation authorities on the one hand and German officials on the other. At first the intention was to confine the contents to technical terms concerned with the regulation of the marketing of food stuffs, then the claims of agriculture came under consideration and ultimately the range of work was extended to cover the whole field of agriculture and the most important technical aspects of food production.

Though it is difficult to judge any dictionary without a prolonged period of use, the work of compilation appears to have been very well done, German efficiency and thoroughness having here been put to good use. A very large number of unusual words, not infrequently used but not met with in the many other German technical dictionaries known to the reviewer, have been included. A few of the English equivalents might perhaps be questioned by purists: e.g. *Fore-molar* instead of *Pre-molar* for Vorderbackenzahn; *Turnip rape*, instead of *Winter turnip rape* for Winterrübsen. But there is no doubt whatever of the practical value of this dictionary, which can be recommended to all concerned with the translation of terms relating to the numerous branches of agriculture including veterinary science, botany, phytopathology, forestry, engineering and machinery, and many other aspects of food production.

To the English-German section a useful list of weights and measures (translated, *dimensions and weights* by the author) is appended; and, presumably as an aid to those with a limited knowledge of German, the main root of compound words is in most cases marked off by a colon from its termination, a device which looks strange to the linguist's eye, but probably serves its purpose.

Should the question of reprinting arise at some later date, the publishers will doubtless realize that the dictionary is well worth a stronger binding and better paper, though the present edition is well arranged and printed, having regard to the limited resources available in 1947.

QUENOUILLE, M. H.

Introductory statistics.

Butterworth-Springer Ltd., London 1950 : 30s. : Pp. xii + 248 : 52 figs. :

11 tables.

The object of the author of this work is to satisfy the twin requirements of furnishing the student with an elementary non-mathematical text book on statistical methods, and of helping research workers to a fuller understanding of the methods needed in the analysis of their results. No pains have been spared to describe the arithmetical calculations in detail, and to provide numerous examples to give practice to the reader. Behind it all there is an undeniable authority, as befits an author who is an accomplished mathematician. The selection of the material to be included is good, and the order logical. The chapter headings are:—Presentation of Sets of Measurements, Normal Distribution, Comparison of Two (and then Several) Sets of Measurements, Attributes and Comparison of Proportions, Inter-relations of Sets of Measurements, Concomitant Observations, Transformations and Non-Normal Distributions, and Sampling Methods. Each chapter contains a basic number of sections, followed by a summary; then additional specially marked paragraphs are added on supplementary or more advanced topics, these in turn being followed by a summary of their contents. A set of the necessary statistical tables is added as an appendix. The book goes further than the typical text on statistical methods in several directions, notably in the chapters on transformations and on sampling methods, the latter going into some detail as to how random samples can be obtained with the aid of a table of random

numbers. The biological experimenter, whether in the field or laboratory, will find this book particularly suited to his needs.

J.W.

YATES, F.

Sampling methods for censuses and surveys.

Charles Griffin & Co. Ltd., London 1949 : Pp. xiv + 318 : figs. : tables.

The book is concerned with the use of sampling methods in censuses and surveys where quantitative information is required about the whole of some population or aggregate. A well-chosen sample can usually provide reliable information about the whole of the population to any desired degree of accuracy. In some instances sampling is an alternative to a complete census, and may be preferable mainly because of its cheapness and convenience, as for example in censuses of human population and of industrial and agricultural productivity. But for surveys in which much detailed or technical information is sought, a complete investigation may be impracticable, since the methods that could be used would not ensure a reliable response. In such cases a sample survey, carried out if necessary by specially trained observers, offers the only means of obtaining the desired information. Sampling methods are necessarily used in the study of wild populations, in surveys of agricultural or industrial practice, and in many sociological enquiries.

Dr. Yates's book is the most comprehensive and adequate treatment of the subject that has appeared. In the first three chapters the principles of sampling are explained, and a wide variety of sampling methods appropriate in different sorts of investigation are described. Chapter 4 discusses practical problems arising in the planning of a survey, including methods of collecting the information and methods of taking advantage of information already available about the population. Chapter 5 discusses problems arising in the execution and analysis of a survey, and includes an account of the use of punched card equipment. The last three chapters are concerned with the calculations to be carried out on the data to give estimates for the whole population and standard errors of these estimates; and the relative efficiency of alternative sampling methods is discussed. New results in the theory of sampling are given. Although mathematical proofs are omitted, these chapters are more difficult reading than the rest of the book, and (except with mathematical readers) will mainly serve for reference as the need arises. Throughout the book, the general discussion is illustrated by examples, of which the majority are drawn from agricultural surveys. There is an extensive bibliography.

F.J.A.

FISHER, R. A.

The design of experiments.

Oliver and Boyd, London and Edinburgh 1949 : 5th ed. 12s. 6d. : Pp. xi + 242 : 5 figs. : 39 tables.

This well known book, which on first publication was the pioneer text in the subject, continues to be much in demand. Two short sections only have been added since the book was last reviewed in these Abstracts (cf. *Plant Breeding Abstracts*, Vol. XIII, p. 272). Following § 62, which deals with the calculation of fiducial limits for a mean, an ingenious method has been added in § 62.1 to calculate the fiducial limits of a ratio between quantities having normally distributed estimates. The method involves the solution of a quadratic equation, which is not hard in itself, but the reader would have been assisted by a more detailed exposition of the calculations made on Darwin's data which led up to the quadratic. The other addition is § 35.01, where after discussing Graeco-Latin and higher squares along the lines of complete orthogonalization in two dimensions, a short reference is made to the possibility of doing the same in three (or more) dimensions by starting with the Latin cube and then introducing additional alphabets. An algebraic proof is given of the formula for the maximum number of modes of subdivision. Configurations such as the one illustrated (cube of 3 in ten alphabets) facilitate the solution of problems of confounding discussed in succeeding sections.

J.W.

MALÉCOT, G.

Les mathématiques de l'hérédité. (The mathematics of heredity).

Masson and Cie, Paris 1948 : 100 fr. : Pp. 63 : 9 figs.

One of the most valuable contributions of modern mathematical genetics has been the synthesizing of the two originally divergent and antagonistic schools of thought represented by the biometricians and the Mendelians. The biometricians, notably Pearson and Weldon, continued the statistical approach initiated by Galton, and laid emphasis on continuous variation and the importance of small cumulative changes for the theory of evolution. Following the rediscovery of Mendel's work in 1900 a reaction set in. Men such as de Vries, Bateson and Morgan gave pride of place to large mutational changes, but failed to give a satisfactory explanation of evolutionary progress.

An important step forward was made in 1918 when R. A. Fisher showed that the results of the biometricians, particularly the correlations observed in human families, could be obtained by a statistical analysis of quantitative characters based on the Mendelian theory of particulate inheritance. Further advances were made in the late '20's and early '30's by the work of R. A. Fisher, J. B. S. Haldane and Sewall Wright. Evolutionary progress was to be explained by the action of natural selection on the genetically diverse material provided by random mutation. Specific gene models were considered, and for given mutation rates and selective advantages the evolutionary consequences could be ascertained by mathematical analysis. This new approach thus provided powerful arguments in support of theories which previously were widely held with insufficient justification.

M. Malécot's monograph *Les mathématiques de l'hérédité*, sets out to give a brief, but by no means exhaustive account of the kind of mathematics that has been used to deal with the problems of population genetics and evolutionary theory. Chapter I gives a short but clear introduction to the basic concepts of modern Mendelian theory such as genes, loci, chromosomes, dominance and recessiveness; and it also introduces the coefficients of inbreeding and relatedness. Chapter II is concerned with the correlations between related individuals in a stationary population and largely follows the treatment initiated by Fisher in 1918. The third chapter deals with evolution in Mendelian populations and mentions such problems as the random extinction of neutral genes, the action of selection in both large and small populations, and finally the influence of migration.

The mathematical treatment is everywhere abstract and generalized, so that many of the results obtained are wider generalizations of those previously given in more specific instances by Fisher, Haldane and Wright. The section on migration contains in particular some of M. Malécot's own contributions to the subject and is of special interest.

The main function of this book is to illustrate the value and application of generalized statistical methods to the problems of evolution and population genetics. It offers little to those who are unwilling to accept a rigorous mathematical discipline. On the other hand, anyone wishing to undertake the use of precise statistical investigation into such problems has much to gain from reading M. Malécot's clear and lucid outline of some of the available methods.

N.T.J.B.

VESTAL, A. G.

Minimum areas for different vegetations. Their determination from species-area curves.

University of Illinois Press, Urbana 1949 : \$2.00. : Pp. vi + 129 : 4 figs. : 26 tables.

The author develops the use of species-area curves (plotted semilogarithmically) and suggests their utilization for the determination of the sizes of areas to yield standard degrees of representation of the species to be found in the association. Hitherto, such curves had produced suggestions of doubtful validity as to "minimum areas" for adequate representation. Even if the ultimate understanding of the problems may be far off, the author feels that practical use of these curves can be made, for though a single point cannot be directly plotted, two points separated by fixed ratios of "species-number-increase" and "area size" can be found to have a unique solution. On some curves an alternative solution can appear but is obviously and recognizably a false answer to the real question.

Earlier work by Vestal and Heermans had suggested that an area containing half the number of species in a "fair sized stand" could be regarded as the "smallest representative area" and these two areas were in the ratio of 50 : 1 in area. A "minimum area" five times that of the "smallest representative area," was found to have all the important species and almost half the minor ones. The interrelation is most easily set out thus:—

Representative area $\times 50$ = fair sized stand.

Species of " " $\times 2$ = species of fair sized stand.

(Also representative area $\times 5$ = minimum area).

Comparison with other types of vegetation showed the relationship of these area and species ratios to appear consistent. As a result of this the author develops the use of these S curves and shows how data in different forms, as recorded by various schools of workers, can be converted for use in their construction. He shows how it is possible to find the two points, for the "smallest representative area" and the "fair sized stand" with the given interrelationships.

The properties of these curves are discussed and the author suggests that in certain classes of cases other ratios may be advisable. The behaviour of the curves is particularly discussed with reference to their partial departure from the α curves of Fisher (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 363).

The main bulk of the work is devoted to the results that the author has found by applying this method to the recorded data of 240 vegetation types, obtained by various workers. These results are tabulated according to groups of similar vegetation types and give both species number and area for the "smallest representative area" and the "fair sized stand." Finally the author compares and discusses the order of magnitude of these values for the different classes of vegetation. The implication of the findings is that often a smaller area than would be expected is found to be representative and the writer points to the obvious usefulness of these results to those trying to conserve natural communities or representative remnants of them. The work ends with a very brief discussion of hypotheses to explain these species-area curves, and the particular problems pertaining to them upon which further study is needed.

In all, the work represents the results of development of the practical usefulness of the species-area curves, and as such will provide information and ideas that will be helpful to all ecologists. From the theoretical side the writer admits the shortcomings of the technique, but suggests that until there are more data collected in a truly comparative form the mathematical understanding of the curves cannot be expected.

This work should help to establish the need for definite standards of reference area for different types of community.

G.E.D.

DEMEREK, M. (EDITOR).

Advances in Genetics. Vol. III.

Academic Press Inc., New York 1950 : 45s. : Pp. 267 : figs. : tables : plates.

The third volume in the series edited by M. Demerek (cf. *Plant Breeding Abstracts*, Vol. XIX, p. 913) has retained the previous standard of a well produced collection of comprehensive surveys dealing with diverse genetical investigations. In this series, the absence of a preliminary section of an introductory nature is noticeable, but the lack of superfluity is commendable. A useful index is provided for the otherwise separate papers, each of which has an excellent bibliography.

Observations on the cytology of bacteria, contributed by Berthe Delaporte of l'École des Hautes Études, Paris, is the first paper, which discusses the various methods of studying bacterial cytology. An account is given of observations on the cytology of round, ovoid and rod shaped bacteria, on nuclear structures in a streptomycin-dependent strain of *Escherichia coli* and the lysis of *Bacillus cereus* and *E. coli* by bacteriophages. Numerous drawings and photographs are included.

The next review, *Biochemical genetics of Neurospora*, by N. H. Horowitz of the California Institute of Technology, deals with the current status of *Neurospora* research under the headings: cytology and genetics; biochemistry; and the gene as a unit. Literature on

position effects in *Drosophila* and *Oenothera lamarckiana* is surveyed by E. B. Lewis of the same institute, in his article *The phenomenon of position effect*. Two types of position effect are distinguished, the variegated or V-type, associated with a mosaic phenotype, and the stable or S-type, in which a phenotypic change of the kind caused by most gene mutations occurs. *The theory of genetical recombination* by A. R. G. Owen of Cambridge University, England, is a survey of theoretical concepts regarding linkage, cytological and genetical evidence for interference and mathematical treatment of recombination.

A review of methods of maize breeding and the genetics of the characters concerned is presented by F. D. Richey of the United States Department of Agriculture, Knoxville, Tennessee, in his article *Corn Breeding*. Different theories put forward to account for the phenomenon of hybrid vigour are discussed.

The last paper, *Parthenogenesis in animals* by E. Suomalainen, of Helsinki University, gives a detailed survey of the subject.

FYFE, J.

Lysenko is right.

Lawrence & Wishart, London 1950 : 2s. 6d. : Pp. 65.

At the beginning of this small booklet we are told that statements of the "popularizers of bourgeois biology" to the effect that an acorn will always develop into an oak or a wheat grain into a wheat plant "are simply not true," and that "anything that happens to living organisms has to be considered as possibly influencing their heredity." Darwin is quoted, and Michurin too, as having believed that heredity could be changed by grafting. The familiar example of how Lysenko has changed winter wheats into spring wheats is quoted in corroboration. Many other important aspects of Michurinism cannot, we read, be described in the space available. This is regrettable, for the title had led us to anticipate the announcement of some new experimental evidence, possibly by the author himself, who is engaged in plant breeding work in Great Britain, to clinch this old controversy of nature *versus* nurture. The time has come, we feel, when mere repetition of the words of the accepted authorities, whether on the one side or the other of this very thorny fence, is not enough. Several of the crucial experiments of Lysenko and his school have been repeated, with negative results, both outside and within the Soviet Union (cf. *Plant Breeding Abstracts*, Vol. XI, Abst. 699; Vol. XV, Abst. 1338; Vol. XVII, Abst. 1342; Vol. XX, Absts. 733 and 872; and Vol. XXI, Abst. 211), but the present author makes no reference to them nor does he provide any actual data of his own. His most original contribution would seem to be his remarks on chromosomes. They are described in mitosis and meiosis and as to their role, "the Michurinist view of heredity gives the clue." A mutation represents "a specialized requirement and makes the organism better prepared to meet a persistence or repetition of the unusual circumstance which evolved it. If those circumstances do not persist or recur, the other, normal chromosome is still available to cope with the more normal condition." The harmful effects of inbreeding are thus ascribable to the production of offspring without the mutant or without the normal chromosome.

The essentially practical nature of Michurinism is emphasized and this accounts for its popularity and what is referred to as the success of the Stalin Plan in converting the Russian steppes into "something not unlike the English countryside." The attainments enumerated include "The introduction of vernalization on millions of hectares, intra-varietal crossing, changes in the organization of seed production, the breeding of new varieties of crops by Michurinist methods, supplementary pollination, transformation of millet from a poverty crop to a high-yielding crop," the special feature of all of which lies in the fact that in their development, scientists and farmers worked hand in hand. This state of affairs is contrasted cogently with the rarefied academic atmosphere in which the so-called Mendel-Morganists work in other countries, and with the hybrid corn industry in the USA, where, quoting Professor Fisher, "theoretical ideas have, on the whole, been insufficient to explain what has been achieved." It was this insufficiency which led the author to "change his ideas." We shall look forward to reading a fuller and more adequate statement of the evidence on which the change was based, and particularly some fresh examples to take their place beside the much quoted spring wheats.

We also wonder in several places whether the author is strictly accurate in his statement of facts; on p. 39–40, for instance the remark that “no communist Soviet biologist (and probably no non-communist) has declared himself a supporter of Mendel-Morganism,” reads strangely in the light of declarations at the July-August 1948 Session of the Lenin Academy of Agricultural Sciences (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2000); and the presentation of Lysenko’s views on intraspecific competition on p. 57–58, accords with no version that we have met with in the original Russian publications, most of which will be familiar to readers of *Plant Breeding Abstracts*. Certain of the more controversial aspects of Michurinism such as selective fertilization and multiparental fertilization receive hardly any mention, so that the picture given is by no means the full picture; the more extreme critics such as Darlington and Huxley are answered in trenchant terms: “J. Huxley’s understanding of Marxism is on about the same level . . . but unfortunately he lacks C. D. Darlington’s special gift of compressing his errors,” but more balanced accounts of the facts such as that published by this Bureau (cf. *Plant Breeding Abstracts*, Vol. XVI, p. 365) are not referred to at all. In fact it is specifically stated that the controversy is such that “we cannot expect to have it explained ‘impartially’ by somebody standing outside it.” This evidently explains the very categorical view taken by the author: it is for him *either* Mendel *or* Michurin; no other choice is envisaged and he leaves no doubt as to which side his partiality is on. We on our part feel justified in asking for experimental evidence. The final issue is not what we wish to believe but what the facts permit us to believe. It may be true that *Lysenko is right*. We await the proof.

STEBBINS, G. L. (JUN.).

Variation and evolution in plants.

Oxford University Press, London 1950 : 50s. : Pp. xix + 643 : 55 figs. : 9 tables.

One of the most encouraging signs to-day in studies of evolution emanating from the western world is that the evolutionary problem is no longer viewed controversially, as an *either or*, but synthetically: the discussion no longer centres round the old antitheses environment *versus* heredity, mutation *versus* selection, polyploidy *versus* gene change and the like. The process is seen as a complex system in which all these and many other factors have played their part, some more and some less, according to the particular organism which we choose to study and the stage in its evolution which we choose to consider. The book before us is an admirable example of the modern approach and anyone who reads it carefully will put it down with the impression that variation and evolution in plants is much less of a mystery than it is generally thought to be, much more susceptible of rational interpretations and ultimately, as pointed out by the author in his final sentence, of control by man. Thus an examination of the nature and mechanism of variation in the first four chapters leads the author to conclude that individual variation, in the form of mutation and gene recombination, acted upon by natural selection, fluctuation in population size, random fixation, and isolation, is sufficient to account for all differences, both adaptive and nonadaptive, which exist between related races and species. The differences between genera and the higher groups are such that they can be accounted for by a projection of the same process. The next chapter is devoted to the genetical systems that differentiate the species and other groups and how they arise. A predominant role is ascribed to isolation, and chapter 6 discusses the various types of isolation that can serve to keep species apart: purely spatial isolation, strictly ecological isolation of sympatric forms or different combinations of the two. Once differences have been established, new combinations can arise by hybridization, discussed in chapter 7, by chromosome changes of various kinds, discussed in the next two chapters, or by a combination of genic and chromosomal change as in structural hybrids (chapter 11). Chapter 10 comprises a masterly analysis of the highly complex phenomena of apomixis, which have confounded both taxonomists and evolutionists in the past. The researches by the author and his associates on the agamic complex in *Crepis* have done much to elucidate this difficult group and the belief is expressed that a clarification of the genetical and evolutionary inter-relationships of other similarly difficult groups such as *Taraxacum* and *Hieracium* would be

possible if a thorough search were made for the diploid sexual species, 5 out of 7 of which he has succeeded in finding in *Crepis*.

Evolutionary trends in caryotype and external morphology are traced in chapters 12 and 13, and a certain amount of correlation is discovered between them: for instance asymmetrical caryotypes are generally found in plants with specialized habits. No attempt is made however to formulate any sweeping generalization; again the author favours the realistic view of morphology advocated by Ganong and many arguments as to the strict homology of particular organs are regarded as entirely futile, since "such regularities of phylogenetic progression which may be observed are based, not on any predetermined laws or principles, but on regularities in the selection and establishment of certain types of mutations and in the rejection of others." Long-continued trends in evolution are regarded as being guided entirely by natural selection and no evidence can be adduced for the existence of orthogenesis or any recondite, hidden guiding force. A change of environment on the one hand and the ability of the organism to respond on the other are necessary to effect a change; the main phyla seemed to originate after some cataclysmic change in the earth's crust, later evolution has consisted of increasing diversity and more gradual change, the rate of which is governed by the amount of genetic variability in the population; the structure of the population, whether large or small and whether continuous and panmictic or divided into partly isolated subpopulations; the nature of the adaptation of the population to its environment and whether preadaptive gene combinations are possible; and finally, the intrinsic mutation rate.

An understanding of these processes aids plant breeders in their task, which is ultimately "the control by man of organic evolution," and a study of these pages will profit workers engaged in practical work as well as students interested in the wider implications of the problems discussed. The material is presented in a lucid and agreeable style, and the volume is well printed, accurate and attractively bound; there is a bibliography covering some 60 pages and an index covering 20; it has all the qualities required to make it a standard reference work on the subject.

CLEMENTS, F. E.,
MARTIN, E. V. and
LONG, F. L.

Adaptation and origin in the plant world.

Chronica Botanica Co., Mass., U.S.A. 1950 : \$6.00. : Pp. xii + 332 : 7
figs. : 21 graphs. : 47 tables : 85 plates.

This book has been prepared by Edith Clements since the death, in 1945, of both Dr. Clements and Dr. Long. The material is that which was originally intended for the next two booklets of a quartet with this title. The first booklet was published in 1939 (*Factors and Functions in Coastal Dunes*) and this book adds the detailed work at the Coastal Laboratory and Experimental Gardens and at the Alpine Laboratory and Transplant Gardens. It ends with a brief chapter devoted to a summary and to conclusions upon the findings.

The bulk of the book is devoted to full descriptions of the wide range of experiments carried out over the years from the beginning of this century. Much of the material has been published already in the numerous detailed papers upon the various projects that have contributed to the larger scheme.

As such, therefore, this book will not contribute new results. On the other hand it draws the findings together into a book that presents (with the separate Book I) the life work of a distinguished team. It makes a very valuable contribution to the literature of ecology though there is much with regard to interpretation of results that readers may disagree with, especially when they reach the final chapter.

It had been intended that Book IV should cover the summary of the findings and conclusions that have been drawn from them. In fact, this section (unlike Parts II and III) had not been prepared in detail before the death of Dr. Clements and Dr. Long. In this book, therefore, we get in the last chapter only a very bare statement of what might have appeared and consequently it seems unsatisfactory. The statements made are remote from the work

recorded in the earlier chapters. They seem rather dogmatic in tone, and there is insufficient reasoning presented to substantiate them.

Readers therefore must make allowance for the circumstances that surrounded the writing of this final part of the book; in that way the conclusions stated should assume a different importance, and have a very rightful place as a statement of the general views which the authors came to possess after all their years of work.

The book is extremely well printed and in support of the text contains a total of 85 pages of photographs of plant specimens and the experimental gardens. There is also a large number of tables of experimental results. A useful glossary is provided and is particularly valuable because of the different meanings that some of the terms possess in the different schools of thought on this subject. A supplementary list of references contains books mentioned in the text and those that have appeared in connexion with the work, but it is not in the nature of a detailed bibliography.

This book will be found to have an interest for workers on a wide range of botanical subjects, presenting as it does experiments carried out on so many aspects of this problem. In a sense it completes the history of the work done by this team, and we therefore are very much indebted to Edith Clements for tackling the sad and difficult task of rounding off the unfinished writing of the account of its work.

G.E.D.

METCALFE, C. R. and
CHALK, L.

Anatomy of the dicotyledons.

Oxford University Press 1950 : Vols. I and II. : £6. 6s. : Pp. lxiv +
1500 : 317 figs. : tables.

Owing largely to the tediousness inevitably entailed in anatomical work, there have been extremely few investigators who have set out to present a comprehensive review of the range in anatomical structure in such a major group as the dicotyledons. De Bary and Solereder are of course the notable exceptions, but Solereder worked at the end of the last century and no comprehensive publication in English on the systematic anatomy of the dicotyledons has appeared since Boodle and Fritsch's well known translation of Solereder's work, which appeared in 1908.

The *Anatomy of the Dicotyledons*, compiled by Dr Metcalfe and Dr Chalk, sets out to meet the need for an up to date survey of the anatomy of the dicotyledons, an object which it achieves with signal success. Solereder's earlier work does in many ways provide the starting point of the new work, but this has been supplemented by a deluge of later research work, the bibliography of which exceeds two thousand titles. The new publication is moreover far more than a compilation. The authors themselves and their colleagues have incorporated many results of their own investigations, using the copious material provided by living and herbarium specimens at Kew, by the important slide collection at the Jodrell Laboratory, Kew, and by the wood collection at the Imperial Forestry Institute, Oxford. The subject matter of the work is arranged systematically under families, the sequence of the latter being a modification of that in Bentham and Hooker's *Genera Plantarum*, an order perhaps more appreciated by workers in English museums and herbaria than by botanists in general.

Under each family a synopsis is first given of the salient general anatomical features of the family and in particular of its secondary xylem. Detailed descriptions then follow of the anatomy of the leaf, young stem, secondary xylem, root, and any anomalous structures. Notes come next dealing with the putative taxonomic relationships of the new work, special emphasis being laid on anatomical evidences. The economic uses of the members of the family are then summarized, and any application of anatomical methods to the diagnosis or assaying of the plant products concerned is described. Illustrations accompany each family and are of uniformly high quality.

It is evident from this outline that the whole work is cast on monumental lines; it runs in fact to 1500 pages. Its value as a reference book could hardly be overrated, and though the price will put it beyond the means of most individuals no botanical library will be complete without it.

Yet the very size of the book is in some ways a matter for discouragement since the gaps in our anatomical knowledge of even very familiar families become so obvious. This is due to some extent to the tendency of anatomists to work their way along well trodden ruts. Thus there is a wealth of information on hairs and secondary xylem, but very little on the root or on the actual course of vascular bundles in the stem and node. The latter deficiency considerably reduces the value of studies of the vascular anatomy of the petiole which has had something of a vogue.

One is also left with the feeling that several time-honoured but antiquated anatomical categories would have been better dropped altogether or redefined. The authors themselves recognize that pericycle is a vague conception meaning little more than the part of the stem outside the phloem where fibres of some sort are liable to occur. Similarly, there is very little point in referring to an endodermis unless it is characterized by some definite structural feature such as the presence of Casparyan strips.

A further distinction that is of doubtful value is that between leaf trace and cauline bundles. The authors also experience difficulty when they try to distinguish between xylem forming a continuous cylinder and xylem made up of numerous contiguous bundles. The notion of scattered bundles also requires to be made more precise, since these may or may not represent a convoluted ring, a point which can only be ascertained by investigating the planes of anastomosis in the node.

The speculations on phylogeny, which the authors offer with due reserve, also fail in many cases to inspire confidence. In particular, it is far from clear what weight is attached to the various anatomical criteria, or even when this is clear, the reason for the weight attached quite frequently is not. To take but a single example, it is suggested that the occasional anomalous secondary thickening in both families and the presence in both of cluster crystals of calcium oxalate, provide some evidence of affinity between the Caryophyllaceae and the Polygonaceae. It is further stated that no known facts make a close connexion improbable. It is pertinent to point out that occasional anomalous secondary thickening, which is exceptional in both families, is a flimsy basis for asserting a phylogenetic connexion, especially if the types of anomalous secondary thickening are different in the two families, as is the case. Further the authors themselves quote the opinion of Joshi that anomalous secondary thickening in the Polygonaceae is a recent phylogenetic development, not characteristic of the older types in the family. As for cluster crystals, the authors, in a useful appendix, list, among other things, the distribution of crystal types in the various families. Cluster crystals occur in 191 families, ranging from the Ranunculaceae to the Compositae. Their value as an indicator of affinity does not appear to be great. Doubt also attaches to the authors' assertion that no known facts make a connexion improbable. The structure and arrangement of the vascular bundles of the two families are markedly different. The Caryophyllaceae show a continuous xylem ring or a number of separate but usually laterally extended bundles, the metaxylem and even protoxylem being largely secondary. In the Polygonaceae, the vascular bundles are numerous and narrow, with much primary xylem. In addition, the node of the Caryophyllaceae is almost always unilacunar while the node of the Polygonaceae is characteristically multilacunar, facts published long ago by Sinnott *et al.* in a paper listed in the bibliography, but not mentioned in the text under either family.

It is, however, as an invaluable reference book rather than a synthesis of existing knowledge that the present work should be regarded; its usefulness as a source of information scattered throughout the world botanical literature is quite exceptional, and will doubtless prove the starting point of many future anatomical investigations.

MITSCHERLICH, E. A.

Über die Fehler bei Ertragsversuchen. (**On the error in yield experiments**).

Akademie-Verlag, Berlin 1950 : 1.65 DM. : Pp. 26 : 1 fig. : tables. (Dtsch. Akad. Wiss. Berlin Heft 37).

In this small booklet the reduction of errors in fertilizer and variety trials, both with single plants and in the field, is discussed. Uncontrolled variability between repeated experiments

is to be overcome by the "law" that the effects of growth factors are proportional to the deviations from a maximum yield, and (approximate) measures of accuracy, in terms of mean deviations, are suggested. The author outlines his systematic (non-randomized) lay-out for field trials, which should reduce errors if the variation in soil fertility happens to be in the form of a linear trend.

A.S.C.E.

SMITH, K. M.

An introduction to the study of viruses.

Sir Isaac Pitman & Sons, Ltd., London 1950 : 10s. 6d. : Pp. ix + 106 :
2 figs. : 5 tables : 16 plates.

There has been no previous attempt to present a survey of the whole field of virus studies, and in spite of the author's apprehension of inviting criticisms this book brings together the artificial compartments of plant, animal and bacterial viruses with comparative ease. The wide scope, which reveals the relationships between these viruses and the techniques by which they are studied, has been achieved, perhaps inevitably, by a certain degree of simplification, but as an introduction to the subject, designed primarily for the student, the book should not be condemned for that reason. An excellent terminal bibliography, arranged in the order of chapters, provides ready access to further information. Reference to certain diseases and salient points on each page is facilitated by the use of italics in those chapters which cover wide aspects.

HASKELL, G.

Plant breeders of the future.

The Biological Press, London 1950 : 3s. : Pp. 34.

Notwithstanding its title, this 34-page booklet mainly comprises an outline, in popular terms, of the work carried out at the John Innes Horticultural Institution, Hertfordshire, England. In a brief comment on the Russian genetics controversy it is said that "the student can be safely left to decide for himself the question of the new Soviet genetics. He has, on the one hand, Mendel's cool presentation of his results in *Experiments in Plant Hybridization* and, on the other, Lysenko's heated *Soviet Biology*." The booklet ends with some reminiscences of Darwin and recommendations for further reading.

WATTS PADWICK, G.

Manual of rice diseases.

Commonwealth Mycological Institute, Kew 1950 : 30s. : Pp. viii + 198 :
49 figs.

Rice being the staple diet of a large proportion of the world's population, an increasing supply is essential if many present-day problems are to be solved. Factors which reduce yield are of vital importance and the *Manual of Rice Diseases* by Dr G. Watts Padwick makes a timely appearance and focuses attention upon the losses due to disease.

In the preface Dr Padwick quotes the finding of the Famine Enquiry Commission (India) in their report (1945) that "The fungous disease (*Helminthosporium*) was one of the major causes of the serious shortages of the aman crop of 1942-3, which was one of the principal causes of the famine." He then makes the comment "Against such a background, it seems clear that rice disease investigations should be promoted and encouraged in every way possible."

All those who read the Manual will be made to realize that the rice crop is substantially reduced by a variety of diseases. It is further apparent that extensive research is necessary if many of these diseases are to be brought under control. Dr Padwick has made a distinguished contribution to the study of the pathology of the crop by bringing together the available data and revealing the gaps in knowledge.

The author states that when he began in Bengal in 1944 to investigate rice diseases he "soon realized how much of the relevant literature was unavailable to me, and how much was not only unavailable to other plant pathologists in rice-growing countries, but was also

written in languages which many could not read." A glance through the literature lists soon reveals to the reader the truth of this statement for a large number of the references have been published in Japan. All those, therefore, who are responsible for the health, breeding and cultivation of the crop will be indebted to Dr Padwick for having made good this deficiency.

The first four chapters, Part I, describe fungal and bacterial diseases of the foliage, stem and leaf sheath, seedlings and grain and inflorescence. There is also a chapter on diseases caused by nematodes. Each disease dealt with is described at some length and is accompanied by a list of the relevant literature.

Part II, on non-parasitic diseases, deals with those caused by unfavourable soil conditions and deficiency diseases. Some readers may be surprised to find that this part also includes the diseases caused by viruses.

Thirdly there is an Annotated Check-list of the Fungi Recorded on Rice and it is of the greatest scientific value that this information should have been thus organized.

The general plant pathologist will find much here to interest and intrigue him although the main appeal of the book will be to those concerned with rice. To such the Manual should be of utmost value for it makes available information which has previously been inaccessible, provokes thought and should surely stimulate further research.

M.A.K.

ERNEHOLM, I.

Cacao production of South America. Historical development and present geographical distribution.

I. Erneholm, Gothenburg, Sweden 1948 : Pp. 279 : 41 figs. : 36 tables.

Resulting from material written in six languages, collected from ten countries, this book forms a comprehensive account of cacao production in South America. It is divided into two, almost equal, parts.

The historical section is conveniently subdivided and begins with information from the writings of Cortés and Diaz del Castillo concerning the Mayas and the Aztecs. Following the general developments during the colonial age, each of the major cacao producing countries is covered by a chapter on production from the early nineteenth century to 1947, with a single chapter on the minor areas. Chapter VII summarizes the historical growth of cacao production in South America with respect to the world market. The second section, which relates the present distribution of areas of cacao cultivation to the prevailing environmental conditions, follows logically as an explanation of the fundamental factors controlling production and the possibilities of meeting the increasing world demand. Although the text is supplemented by numerous maps showing areas and factors influencing distribution, these might have been more useful to those with superficial knowledge of South American geography if river and place names, noted in the text, were included on each map, in addition to the appendix of three outline maps.

The absence of any reference to cacao breeding work is particularly noticeable in both sections.

Considering the present world shortage, to which the declining state of South American production has contributed, Dr Erneholm's work has a definite topical and economic interest.

RICHHARIA, R. H.

Wealth from waste. The Indian linseed plant from fibre point of view (a new source of textile fibre).

The United Press Limited, Bhagalpur, India 1950 : 8s. : Pp. xiv + 213 : 64 figs. : 52 tables.

As the title suggests, the author is attempting to promote the use of linseed straw as a source of fibre; this is normally destroyed after the seeds have been removed. The advantages of obtaining *wealth from waste* are stressed, with detailed information adapting the results of many years' research to practical purposes which could lead to further development of

industry in the villages, thus increasing employment as well as solving the problem of scarcity of other fibres in the Indian Republic. Dr Richharia's proposals for using this natural by-product were accepted by the Imperial Council of Agricultural Research and recommended to all provincial governments; technical training centres have been established in Bihar and Nagpur. In spite of the efforts made by Dr Richharia the practical application of his work is extremely slow and it is hoped that this publication may stimulate activity.

It is regrettable that a well illustrated, informative volume should have had such a hasty production that many spelling mistakes have been neglected. The phraseology too is sometimes questionable, the illustrations are not always inserted in relation to the text and one photograph is even printed upside down.

Tuinbouwgids 1951. (**Horticultural guide 1951**).

Uitgave van de Directie van de Landbouw, Afdeling Tuinbouw, Den Haag 1951 : 8 : f. 4.

This excellent Dutch reference book on horticulture has undergone further enlargement in its 1951 edition. While its range remains encyclopedic, some sections have been curtailed and some extended, and a section for gardeners inserted. The number of illustrations has been greatly increased, and, in demonstration of the value of this method of direct and rapid explanation, special attention may be directed to the 36 photographs illustrating diseases and pests of vegetables, fruit, flowers and trees.

The enormous amount of valuable and varied information contained in the guide and so easily accessible has already been referred to (cf. *Plant Breeding Abstracts*, Vol. XXI, p. 232) and the present issue, with its 100 additional pages, provides, in addition to the main subject index, three other indexes as well as the numerous tables of contents clearly set out on the sectional guide pages. Thus, in spite of the size of the volume and the variety of its contents, any subject, minor or major, can be traced in the minimum of time. This cannot have been easily achieved and our gratitude is due to the Horticultural Section of the Dutch Ministry of Agriculture and the many collaborators who by their expert and ready assistance have enabled the 1951 Guide to appear in up-to-date form and without delay.

NEW JOURNAL

Turrialba

Turrialba is a new quarterly journal devoted to publications on agricultural research in tropical America. The papers are either in English or Spanish. The first number contains two articles of interest to plant breeders (cf. Absts 1235 and 1434). The journal, price two dollars per year, is obtainable from the Inter-American Institute of Agricultural Science, Turrialba, Costa Rica.

ERRATA TO "PLANT-BREEDING ABSTRACTS" VOLUME XX

Abst. 1592, line 9, **for** "Austrian" **read** "Hungarian."

p. 831, line 29, **after** " . . . 3-80178 times slower" **insert** "than in selfing a diploid, while sib-mating is up to 2-66533 times slower."

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